GENERATING A BRIGHT FUTURE FOR HYDROPOWER

HYDROELECTRIC DESIGN CENTER
U.S. ARMY CORPS OF ENGINEERS

Ellen Ballantine
HDC Regional Design Manager
April 13, 2023

U.S.ARMY
US Army Corps of Engineers®
HDC

HYDROELECTRIC DESIGN CENTER

Mission

Deliver superior quality products and services to our stakeholders through specialized technical expertise, innovation, and partnerships.

Vision

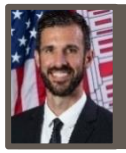
Excellence in hydropower planning and engineering.

Core Values

Doing more than design
Part of the team
Efficient and consistent
Quality is paramount
Committed to responsive service
Adding value in all we do
Leading industry
Build a healthy culture
We listen

Established in 1948 to support new hydroelectric development on the Columbia River

THE HDC TEAM

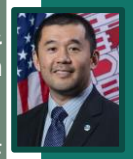


Jordan Fink, PE
Director

John Etzel, PMP
Deputy Director

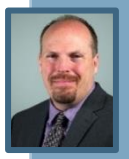
Automation Controls & Cyber Security Branch
Steven Ernst, PE

- **Product Integration** — Artyom Gnatyuk, PMP, CISSP
- **Product Development** — Ben Elder, PE, CISSP
- **Cybersecurity** — Jim Crawford, CISSP



Electrical Branch
John Yen, PE

- **Power Systems** — Deanna Dinh, PE
- **Generation Equipment** — Pete Kleine, PE
- **Protection Systems** — Luke Raynor, PE
- **Control Systems** — Eric Vaughn, PE



Front Office/ Admin Officer
Scot Hale

Hydropower Analysis Center
Mark Parrish

Largest Cyber Engineering Unit in USACE
Designing Cyber ICS & SCADA Solutions

Largest Concentration of Electrical Engineers in USACE
Designing Electrical Hydropower Systems

Largest Concentration of Mechanical Engineers in USACE
Designing Mechanical Hydropower Systems

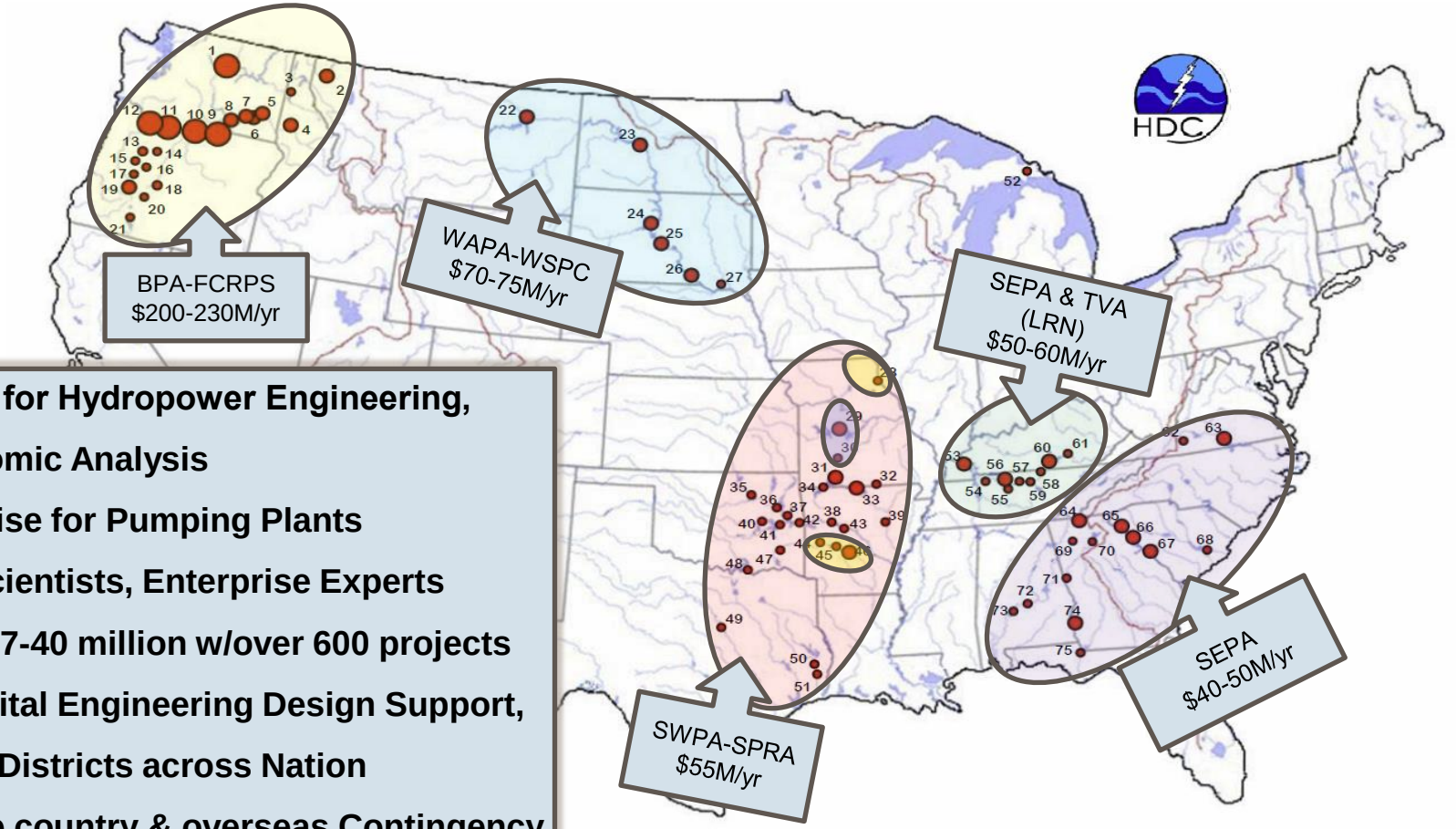
Mechanical / Structural Branch
Jim Calnon, PE

- **Turbomachinery** — Kellen Shide, PE
- **Mechanical Systems** — Jim Kiel, PE
- **Structural** — Sharon Demeaux, PE
- **Engineering Support** — Eric Holzapfel

Program Integration & Delivery Branch
Bree Wilson, PMP, PE

- **Program Analysts** — Mona McGee
- **Regional Design Managers** / **Design Managers**

STRONG REINVESTMENT IN FEDERAL HYDRO



- **Corps' Center of Expertise for Hydropower Engineering, Design, Planning, & Economic Analysis**
- **Technical Center of Expertise for Pumping Plants**
- **Over 170 Engineers and Scientists, Enterprise Experts**
- **Annual HDC Program is $37-40 million w/over 600 projects**
- **Responsible for Large Capital Engineering Design Support,**
- **16 Hydropower producing Districts across Nation**
- **75 Power plants across the country & overseas Contingency**

NWD:
1– Chief Joseph (WA)
2– Libby (MT)
3– Albeni Falls (ID)
4– Dworshak (ID)
5– Lower Granite (WA)
6– Little Goose (WA)
7– Lower Monumental (WA)
8– Ice Harbor (WA)
9– McNary (OR/WA)
10– John Day (OR/WA)
11– The Dalles (OR/WA)
12– Bonneville (OR/WA)
13– Big Cliff (OR)
14– Detroit (OR)
15– Foster (OR)
16– Green Peter (OR)
17– Dexter (OR)
18– Cougar (OR)
19– Lookout Point (OR)
20– Hills Creek (OR)
21– Lost Creek (OR)
22– Fort Peck (MT)
23– Garrison (ND)
24– Oahe (SD)
25– Big Bend (SD)
26– Fort Randall (SD)
27– Gavins Point (SD)
28– Clarence Cannon (MO)
29– Harry S. Truman (MO)
30– Stockton (MO)
31– Table Rock (MO)
SWD:
32– Norfork (AR)
33– Bull Shoals (AR)
34– Beaver (AR)
35– Keystone (OK)
36– Fort Gibson (OK)
37– Tenkiller Ferry (OK)
38– Ozark (AR)
39– Greers Ferry (AR)
40– Eufala (OK)
41– Webbers Falls (OK)
42– Robert S. Kerr (OK)
43– Dardanelle (AR)
44– Narrows (AR)
45– Blakely Mountain (AR)
46– DeGray (AR)
47– Broken Bow (OK)
48– Denison (TX)
49– Whitney (TX)
50– Sam Rayburn (TX)
51– R.D. Willis/Town Bluff (TX)
LRD:
52– Saint Mary's Falls (MI)
53– Barkley (KY)
54– Cheatham (TN)
55– J. Percy Priest (TN)
56– Old Hickory (TN)
57– Cordell Hull (TN)
58– Dale Hollow (TN)
59– Center Hill (TN)
60– Wolf Creek (KY)
61– Laurel (KY)
SAD:
62– Philpott (VA)
63– John H. Kerr (VA)
64– Carters (GA)
65– Hartwell (SC/GA)
66– Richard B. Russell (SC/GA)
67– J. Strom Thurmond (SC/GA)
68– St. Stephens (SC)
69– Allatoona (GA)
70– Buford (GA)
71– West Point (AL/GA)
72– Jones Bluff (AL)
73– Millers Ferry (AL)
74– Walter F. George (AL/GA)
75– Jim Woodruff (FL)

IMPROVING USACE HYDRO RELIABILITY

McNary Powerhouse

- ❑ In PHASE II (Model Testing)
- ❑ 14 New Turbine Runners
- ❑ 3 New Generator Rewinds

Chief Joseph Powerhouse

- ❑ In PHASE II (Construction)
- ❑ 27 New Generator Rewinds

Oahe Powerhouse

- ❑ PHASE IA complete (Engineering Study)
- ❑ 7 New Turbine-Generator Units
- ❑ Full Powertrain Assessment

Fort Randall Powerhouse

- ❑ In PHASE II (Runner design)
- ❑ 8 New Turbine Runners
- ❑ 8 New Generator Rewinds

Barkley Powerhouse

- ❑ In PHASE II (Fabrication)
- ❑ 4 New Turbine Runners
- ❑ 3 New Generator Rewinds

Old Hickory Powerhouse

- ❑ In PHASE II (Awarded - NTP)
- ❑ 3 New Turbine Runners
  - ❑ Optional 4th Unit
- ❑ 3 New Generator Rewinds

Wolf Creek Powerhouse

- ❑ In PHASE I (In Design)
- ❑ 6 New Turbine Runners
- ❑ 4 New Generator Rewinds

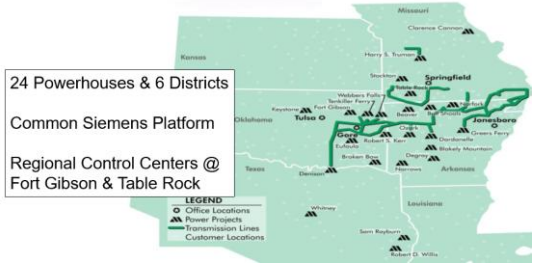
John Day Powerhouse

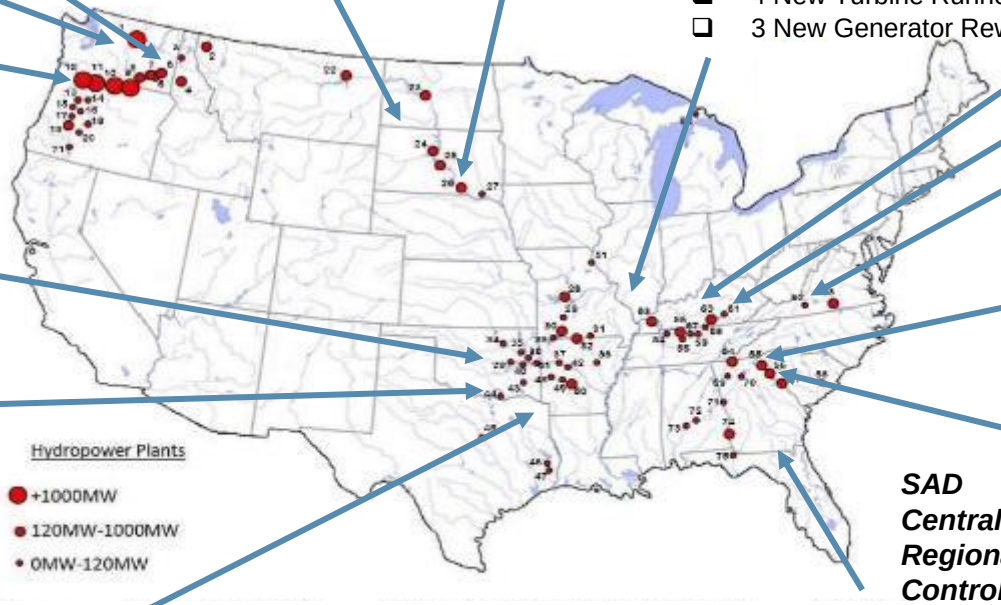
- ❑ In PHASE I (in Design)
- ❑ 12-16 New Turbine Runners
- ❑ 12-16 New Generator Rewinds

Philpott Powerhouse

- ❑ In PHASE II (Construction)
- ❑ 2 New Turbine Runners
- ❑ 2 New Generator Rewinds
- ❑ 15MW TO 19 MW

SWPA6 CONSOLIDATED CONTROL





Hartwell Powerhouse

- ❑ In PHASE II (Construction)
- ❑ 2 New Generator Rewinds

Denison Powerhouse

- ❑ On-site construction complete
- ❑ Replacement of 2 Francis Units

RS Kerr Powerhouse

- ❑ In PHASE II (Construction)
- ❑ 4 New Turbine Runners
- ❑ 4 New Generator Rewinds

SAD Centralized Regional Control

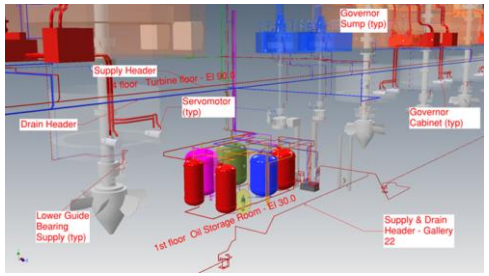
- ❑ 13 Powerhouses & 3 Districts
- ❑ 2 Regional Control Centers

R. B. Russell Powerhouse

- ❑ In PHASE I (Plans and Specs)
- ❑ 1 Rotor Repair

INNOVATION IN HYDROPOWER

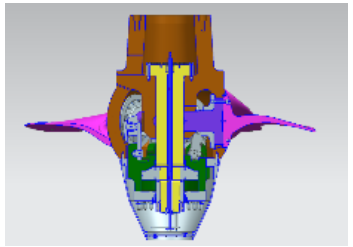
Environmental



Oil Accountability

Water Lubricated Bearings

Environmentally Acceptable Lubricants (Greases & Oils)



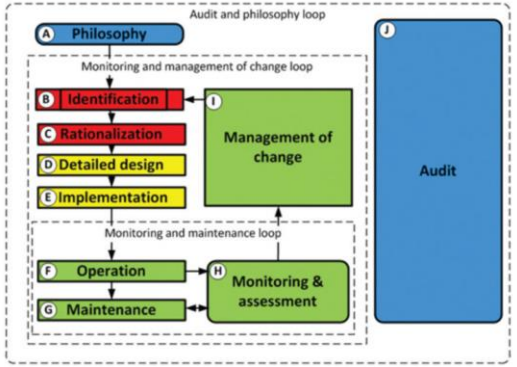
Oil-Free Kaplan Hubs

Gas Insulated Transformers

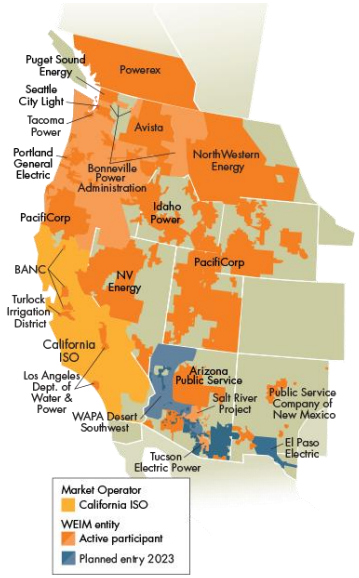
Dissolved Oxygen Turbine Runners

Digital Transformation

Centralized Control and SCADA/GDACS

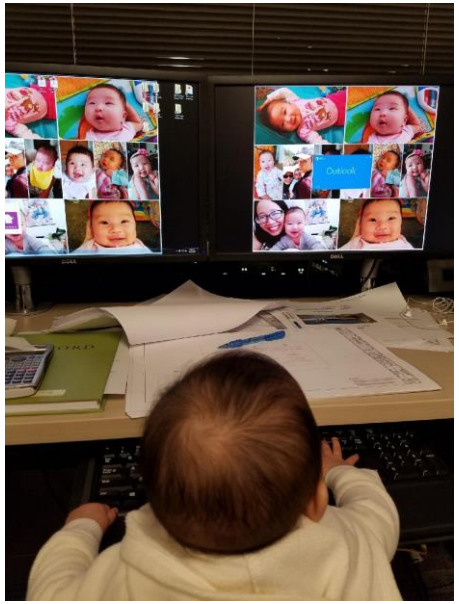


Alarm Management (ANSI/ISA-18.2)



Energy Imbalance Market (EIM)

INSPIRING FUTURE LEADERS IN HYDRO



Future Leader in Hydropower

Professional Development
- Developmental Assignments
- Emergency Operations Deployments
- Academic Degree Training

EIT Program
- Two-year rotational program
- Toastmasters
- Paired Mentor

Recruiting
- Student Internships
- University Partnerships
- Senior Capstone Mentorship

STEM Engagement
- Engineering Week
- High School Career fairs
- Facility Tours


When the sun goes down, hydropower will still be running!
Restricted
No Boats
Here to Dam