Diablo Canyon

Independent

Safety Committee

Public Meeting
June 10 and 11, 2025

Avila Lighthouse Suites

Diablo Canyon Power Plant: State of the Plant Update

June 10, 2025

Justin Rogers, Diablo Canyon Station Director

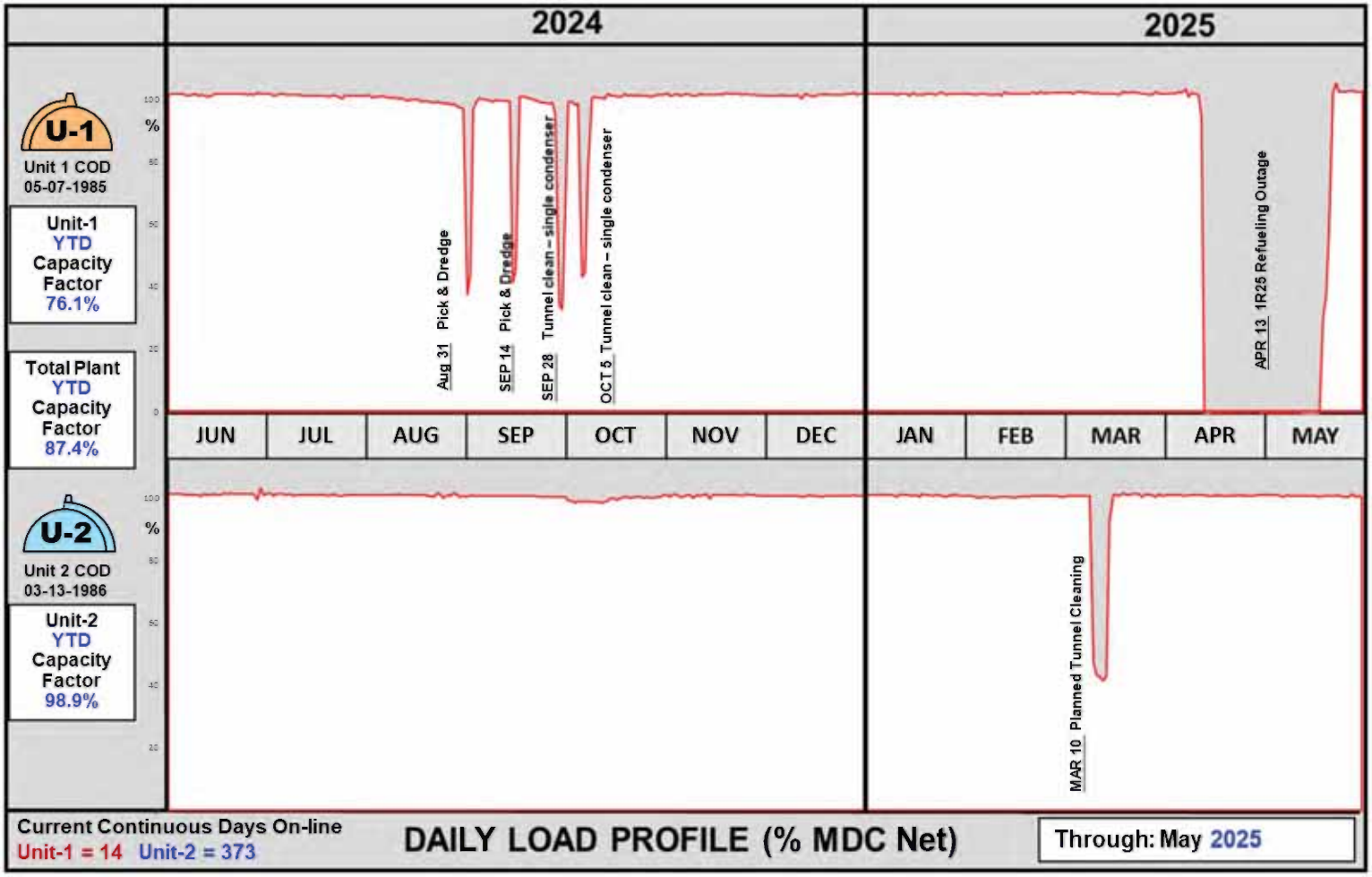
Station Update

Plant Operation

- Units 1 & 2 are safely operating at 100% power
- All Nuclear Regulatory Commission (NRC) Performance Indicators (PIs) are Green

Daily Load Profile: Past 12 Months

Daily Capacity Factor Power History Curves



Key Events - Recently Completed Activities

- **February 24-28: NRC Unit 2 License Renewal Inspection**
- **March 9-14: Unit 2 Tunnel Cleaning**
- **April 21-25: NRC Radiation Protection Inspection**
- **April 21-May 2: NRC Inservice Inspection**
- **May 7: Celebrated 40 Years of Unit 1 Commercial Operation**
- **May 18: Completed Unit 1 Refueling Outage (1R25) with Unit 1 Paralleled to the Grid**

Key Events- Upcoming Station Activities:

- **June 1-7: NRC Biennial Requalification (BRQ) Inspection**
- **June 23-26: Nuclear Safety Oversight Committee (NSOC) Visit**
- **July 6-12 & 20-26: NRC Fire Protection Inspection**
- **July 7-10: Mid-Cycle Self-Assessment**
- **Aug 10-16: NRC Cyber Security Inspection**
- **Aug 25-29: Emergency Preparedness Program Inspection**
- **Unit 2 planned Emergency Diesel Generator (EDG) Major Maintenance Outage Windows (MOWs): EDG 2-1, June 8-17; EDG 2-3, July 3-22; EDG 2-2, Aug 17-26**

Leadership Changes

No Leadership Changes from Last Public Meeting

Questions?

Justin Rogers
Diablo Canyon Power Plant

Diablo Canyon Outage Updates

Erik Werner
Outage Director
June 10, 2025

Agenda

Summary

- Results of Refueling Outage 1R25, Spring 2025
  - Refueling and Major Maintenance Activities
  - Implementation of Major Projects
  - License Renewal Inspections
- Preparations for Refueling Outage 2R25, Fall 2025
  - Scope, Schedule, and Status of Preparations for Refueling Outage 2R25
  - Implementation of Major Projects

1R25 Review

Summary

- Diablo Canyon Unit 1 twenty fifth refueling outage (1R25) was completed during the Spring of 2025
- The 40-day planned outage encompassed scope from planned maintenance and project work, refueling activities and license renewal required inspections
- Approximately 1,000 temporary additional workers supported the safe completion of 1R25

1R25 Key Scope

Primary

- Included large motor overhauls and reactor refueling

Secondary

- Included high pressure turbine replacement and valve inspections and maintenance

Electrical

- Included 4kV/480V Bus H inspections and maintenance

License Renewal

- Included Reactor Vessel specimen Capsule Bravo removal

Projects

- Included reactor vessel inspections and phase one of fuel transfer system equipment upgrades

1R25 Outage Goals

Category	Goal	Actual	Achieved	Category	Goal	Actual	Achieved
Safety	Zero Recordable Injuries	One		Outage Duration	≤ 40 Days	35 D 22 H	
	Zero Nuclear Safety Events	Zero		ALARA	≤31.325 Rem	27.874	
Human Performance	Zero HU Event Site Clock Reset	Zero		Reliability	Power Ascension ≤ 5 Days	3D 4H	
	Zero FME Events	Zero			≥ 90 Days Max Capable Power	Monitor	

We earn the right to continue operating each day

2R25 Preview

Summary

- Diablo Canyon Unit 2 twenty fifth refueling outage (2R25) will take place during the Fall of 2025
- The 40-day planned outage will encompass scope from planned maintenance and project work, refueling activities and license renewal required inspections
- Approximately 1,000 temporary additional workers will support the safe completion of 2R25

2R25 Outage Goals

Category	Goal
Safety	Zero Recordable Injuries Zero Nuclear Safety Events – No loss of decay heat removal
Human Performance	Zero HU Event Site Clock Resets Zero FME Events
Outage Duration	≤ 40 Days
Dose Goal	As Low As Reasonably Achievable ≤ TBD Rem
Reliability	Power Ascension ≤ 5 days Reliability ≥ 90 days max capable power

2R25 Key Scope

Primary

- Including large motor overhauls and reactor refueling

Secondary

- Including high pressure turbine replacement and valve inspections and maintenance

Electrical

- Including 4kV/480V Bus H inspections and maintenance

License Renewal

- Including selective leaching program and continuation of one-time inspections

Projects

- Including reactor vessel inspections and phase one of fuel transfer system equipment upgrades

Thank you

Erik Werner

Diablo Canyon Power Plant

Successful Removal of Capsule B

Presented by

June 10, 2025

Philippe Soenen, Director, License Renewal & Strategic Initiatives

Topics

- **Successful Removal of Unit 1 Surveillance Capsule B**

Key Takeaways

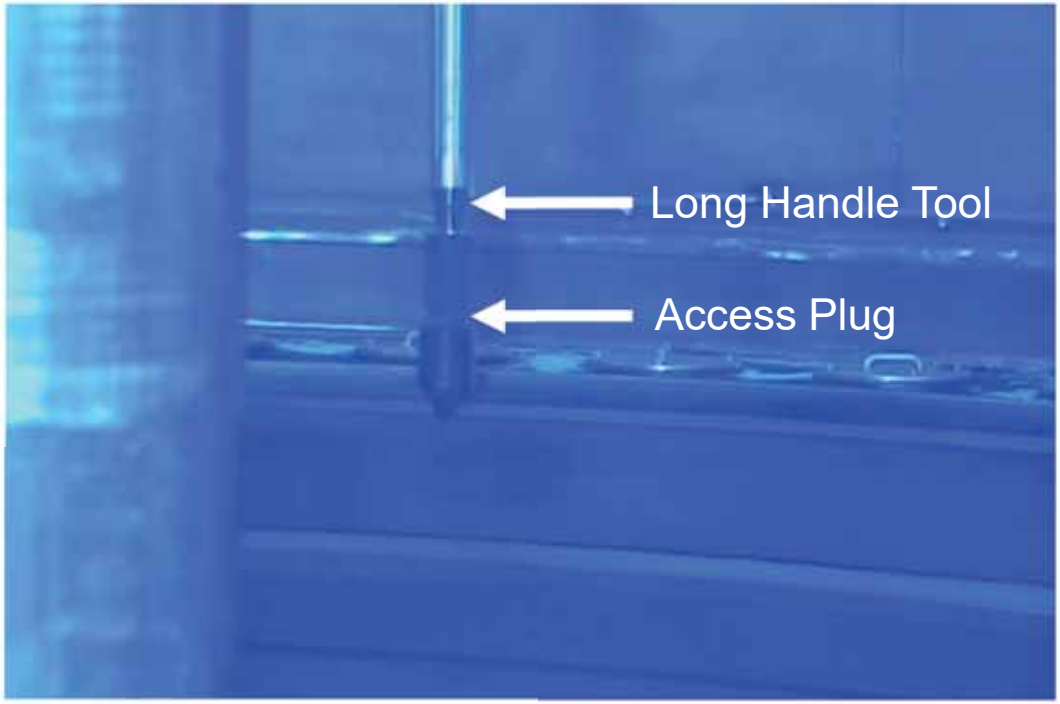
- PG&E successfully removed Unit 1 Capsule B during the Unit 1 refueling outage in April 2025.
- DCPP's reactor integrity program is in full compliance with federal safety oversight regulations
- DCPP License Renewal Application (LRA) includes the basis for concluding that the reactor vessels will remain safe for 60 years of operation using currently available information
- Nuclear Regulatory Commission (NRC) completed an independent review of the LRA

Reactor Vessel Material Surveillance Coupon Withdrawal

- **Unit 2 reactor vessel coupons have all been withdrawn**
  - Data is provided in the LRA to demonstrate acceptability through 60 years of operation
- **Unit 1 reactor vessel coupons**
  - Data is provided in the LRA to demonstrate acceptability through 60 years of operation
  - LRA credits withdrawing one final coupon to support up to 60 years of DCPP operations and to benefit the industry for more than 60 years of operations
    - PG&E successfully retrieved the Unit 1 coupon in the Spring 2025 refueling outage (~101 Effective Full Power Years) as approved by NRC [ML23199A312]

Capsule B Removal During Unit 1 Refueling Outage

- **Unit 1 Capsule B Removal**
  - Worked with industry experts to evaluate available options to safely remove Capsule B
  - Lessons learned from previous attempt was considered
  - Long handle tool was modified
    - Capsule B was successfully removed using the long handle tool and other contingency options were not required.



Capsule B Removal During Unit 1 Refueling Outage

- **Capsule B Successfully Removed**
  - Transported offsite for testing and analysis
  - NRC regulations require results to be submitted to NRC within 18 months of the withdrawal
    - Results will be publicly available once submitted to NRC

Video of Capsule B Removal

Westinghouse Next Steps

- Surveillance Capsule withdrawn and shipped to Westinghouse testing facility
- Capsule is moved into the Hot Cell and is disassembled
- Multiple types of destructive testing methods are performed on the Irradiated Capsule contents
- Based on the Dosimeters in the Surveillance Capsule, Westinghouse completes a neutron fluence analysis
- Evaluation results are documented in a Surveillance Capsule Report that is required to be submitted to the NRC within 18-months of Capsule Withdrawal and will be publicly available

Questions?

Engineering Department & Project Planning Updates

Diablo Canyon Power Plant

Allen Wilson
Vice President, Engineering

June 10, 2025

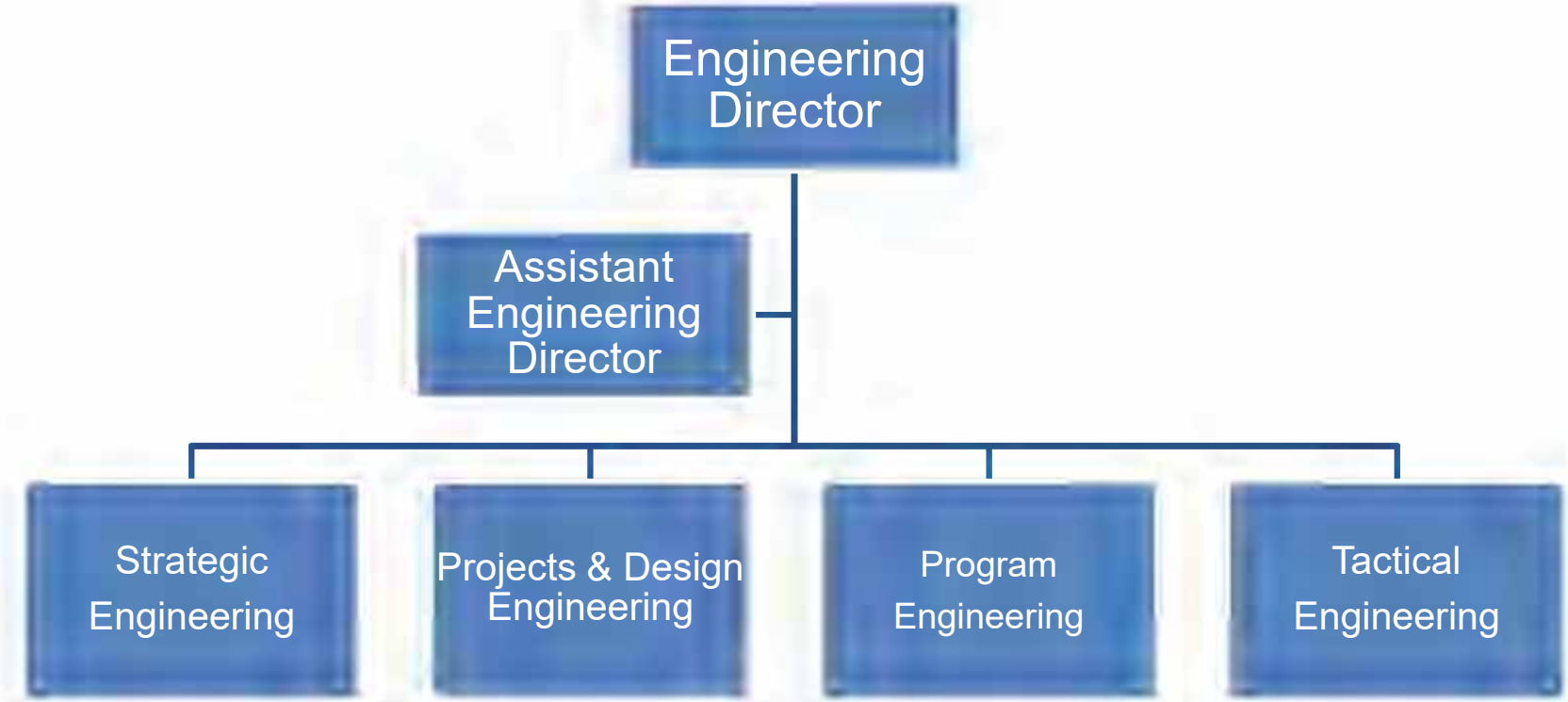
Engineering's Role

Continue in the role as the strong **Technical Conscience** for the organization

A set of principles that guide the behaviors to ensure technical and ethical support of the operation, maintenance and modification of nuclear power plants.

2025 Engineering Organization

2025 Engineering Services



Knowledge Transfer & Proficiency Committee

Working group to identify and manage knowledge, qualification and proficiency.

- Composed of Supervisors/Mentors within the Engineering organization, includes Learning Services representative
- Charter:
  - Identify engineering knowledge needs
  - Assign Knowledge Transfer (KT) plans to identified needs and monitor progress
- Coordinate with the Engineering People Committee (EPC) to match KT needs with opportunities for individuals interested in those areas of need

Managing Proficiency by Engagement

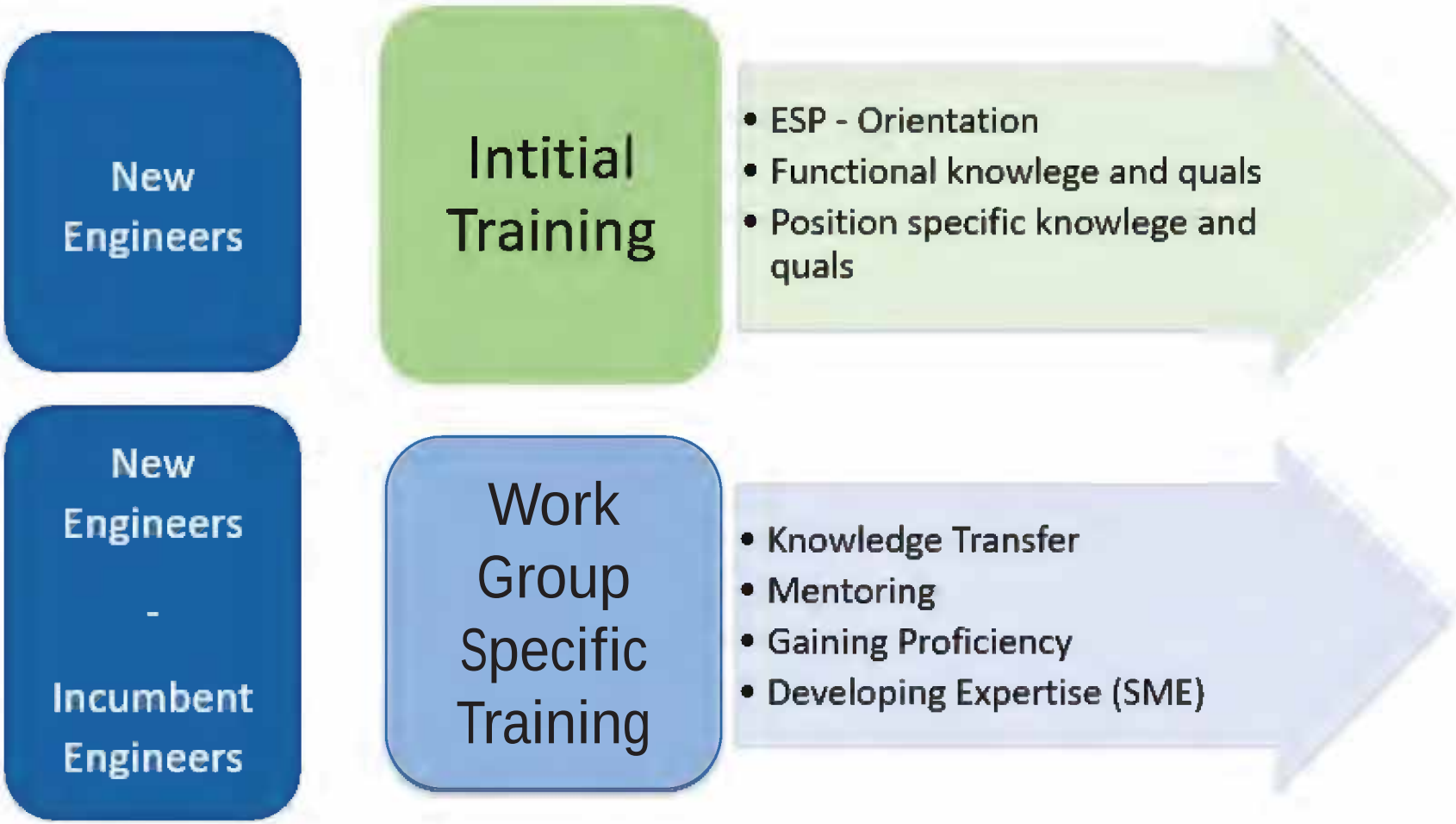
Employee Engagement

- Pre-Job Brief (Job Preparation & Risk Management)
- Standards (Procedure Use & Adherence)
- Peer-to-Peer Coaching
- Training and Qualification
- Mentoring (Technical, Process & Behaviors)

Leadership Engagement

- Field & Training Observations
- Excellence in Standards

Managing Proficiency by Training & Qualification



Engineering Staffing Summary

- Continue to effectively manage increased staffing through engaged leadership, knowledge transfer, and training to maintain strong safety and human performance

- Leadership engagement through Observation Review Meetings to ensure safe and reliable operation through continued operations

- Continue to be the strong Technical Conscience and advocates for DCPP

Major Project Planning

- PG&E continues to make necessary project investments to ensure safe and reliable operations

- The NRC continues to inspect, assess, and reaffirm that Diablo Canyon is operating safely and is among the highest performing plants in the nation

- Additionally, the Diablo Canyon Independent Safety Committee (DCISC) thoroughly evaluates activities at DCPP on a routine basis

- We are in various phases (design, procurement, material fabrication) for our safety and reliability focused major projects, highlights includes the replacement of the Unit 2 high pressure turbines in 2025 and feedwater heater contingency replacements in future outages;
    - these large projects are essential to ensure sustained high performance and delivering reliable energy for California and our customers

Major Project Planning

Completed Unit 1 Projects – 2025	2025 Unit 2 Projects
Digital Rod Position Indication Display Obsolescence	Digital Rod Position Indication Display Obsolescence
10% Steam Dump Controls	10% Steam Dump Controls
Fuel Transfer Cart Upgrades	Fuel Transfer Cart Upgrades
230kV & 500kV Tie Line Relay Upgrades	500kV Tie Line Relay Upgrades
Condenser Saltwater Expansion Joint Replacement	Intake Traveling Screen Frame Replacements – *cont'd*
Intake Traveling Screen Frame Replacements – *cont'd*	Circulator Water Tunnel Vent Pipe Replacement
Circulator Water Tunnel Vent Pipe Replacement	Steam Generator Blowdown Tank Replacement
Pressurizer Safety Valve Inlet Restraint Modification	230kV Tie Line Breaker Upgrades
Reactor Vessel Inspections	High Pressure Turbine Replacement
Digital Paper Chart Recorder Upgrades	**Common Unit 2025 Projects**
Pipe Gallery Vital Area Upgrades	Biolab System Upgrade
Condensate Storage Tank Floating Roof Replacement	Plant Air Compressor Replacements 0-8 & 0-9
High Pressure Turbine Replacement	Spare High Voltage Transformer Relocation

Thank you

Allen Wilson
Vice President, Engineering

Diablo Canyon Power Plant Regulatory Performance Update

Jordan Tyman
Director, Risk and Compliance

DCPP Performance Summary

February 2025 – May 2025

- DCPP continues to provide safe, clean, and reliable electricity to Californians
- Since the last update to the DCISC, the NRC oversight of DCPP included approximately ~2,000 hours of inspection time
- Update on the very low safety significance violations received since the last DCISC update
- DCPP continues to remain in the highest performance category for all NRC Performance Indicators

NRC Performance Indicators

DCPP remains in the highest performance category

- In addition to performing inspections, the NRC also evaluates every nuclear plant using performance indicators
- NRC assesses and evaluates licensee performance using 16 separate indicators related to various aspects of plant operation
- DCPP continues to remain in the highest performance category of the NRC's Reactor Oversight Process Action Matrix
  - Performance indicators within the expected range (i.e., Green)

Regulatory Update

February 2025 – May 2025

NRC Violations

- DCPP received one violation of very low safety significance (i.e., Green) since the last DCISC update (as defined by the NRC Reactor Oversight Process)
  - o Violation associated with two examples of workers inconsistently following DCPP standards

Regulatory Update

February 2025 – May 2025

Licensee Event Reports (LER)

- There were no LERs issued during the reporting period

Upcoming Inspections

Upcoming NRC Inspections

- Biennial Requal (BRQ) Inspection – June 1-7
- Triennial Fire Protection Inspection – July 6-26
- Cyber Security Inspection – Aug. 10-16
- Emergency Preparedness Program Inspection – Aug. 25-29

Licensing Activities

License Amendments

- DCPP has submitted a number of License Amendment Requests (LAR), which are with NRC for review and approval (e.g., TSTF-505 for Instrumentation, Online Monitoring (OLM), etc.)
- DCPP plans to submit additional LARs over the next few months consistent with industry best practices (e.g., E-Plan rebaseline to NUREG-0654 Rev. 2, standard industry LARs, (e.g., TSTFs), etc.)

DCPP Regulatory Performance

February 2025 – May 2025

- DCPP continues to remain in the highest NRC regulatory performance category
- Violation received since the last DCISC update was of very low safety significance
- DCPP continues to provide safe, clean, and reliable electricity to 4M Californians

Thank You

Jordan Tyman
Diablo Canyon Power Plant
Director, Risk and Compliance

Per Peterson, Member, with Richard McWhorter, Consultant

1. Spent Fuel Pool Systems with Plant Tour
2. Configuration Management Programs
3. Station Update
4. Meet with Nuclear Regulatory Commission (NRC) Resident Inspectors
5. Safety-Security Interface
6. Workplace Seismic Safety
7. Meet with DCPP Officer
8. New Fuel Procurement
9. Innovation Initiatives
10. Refueling Outage 1R25 Update and Safety Plan
11. Observe Nuclear Safety Oversight Committee Exit Meeting
12. Meeting with San Luis Obispo County Department of Emergency Services

Spent Fuel Systems with Plant Tour

- System Supplies Water and Cooling for Spent Fuel Pool (SFP)
- SFP Systems in Good Health with No Major Issues
- Reviewed Fuel Transfer System Health
  - Manipulator Crane (Containment)
  - Transfer System
  - Bridge Crane (SFP)

Conclusion: DCPP's Spent Fuel Pool Cooling Systems were in good health with no major issues.

System Engineer and Dr. Peterson at SFP Cooling Pumps

Mr. McWhorter and Dr. Peterson at Unit 1 SFP

Configuration Management Program

- Program Ensures Design Bases for Plant Systems and Programs Are Correct, Current, and Documented
- Types of Design Changes
  - Major Modifications
  - Minor Modifications
  - Non-Design Modifications (N-MODs)
- Increased Number of Design Changes Since 2022
- No Major Issues

Conclusion: DCPP's Configuration Management Program was healthy with no major recent problems identified. There are potential opportunities to apply artificial intelligence tools for design change development.

Station Update

- Station Update:
  - Power Production
  - Leadership Changes
  - Regulatory Concerns
  - Major Projects
  - Human Performance

Conclusion: DCPP's update on recent station activities was informative, and no new major issues were identified.

Meet with NRC Resident Inspectors

- Items Discussed Included:
  - Recent Human Performance at DCPP
  - NRC's Recent Issuance of its Annual Assessment Letter
  - Proposal for the NRC to present its End of Cycle Performance Assessment as a Part of the DCISC's June Public Meeting
  - Recent Federal Government-Wide Directives and their Impact on NRC Personnel and Activities

Conclusion: DCISC's meetings with the NRC continue to be beneficial.

Safety-Security Interface

- Manage Changes to Safety and Security Activities to Prevent Adverse Effects on Safety or Security
- Core Activity is Regular Participation by Security in Operations Planning Activities
- No Recent Issues
- Also Discussed Security Staffing

Conclusion: The Safety-Security Interface Program at DCPP was properly designed and being implemented satisfactorily.

Workplace Seismic Safety

- Follow-up To Issue Identified in December 2024 – Unbraced Cabinet in Chief Nuclear Officer's Office
- Recommendation: PG&E should review why an extent of condition for an unbraced cabinet found by the DCISC in July 2024 did not prevent.
- Update Received on In-Process Corrective Actions; Expected to be Completed by May

Conclusion: DCPP provided an update on corrective actions being taken in response to the DCISC's identification of an unbraced cabinet in December 2024. The DCISC should review the issue again after May 2025.

Meet with DCPP Officer

- Maureen Zawalick, Vice President, Business and Technical Services
- Discussed the Fact-Finding Agenda Items and Other Items of Mutual Interest

Conclusion: The regular meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.

New Fuel Procurement

- Contracts in Place for New Fuel Procurement for Cycles 25 and 26
- Several New Features (Minor Changes) Incorporated into New Fuel
- No Current Effort to Change to 24-month Cycles
- Uranium Supply and Processing Stressed by Global Tensions but No Major Concerns for DCPP's Current Needs (through 2030).
- Typical Lead Time for Procuring Additional New Fuel is About Three Years

Conclusion: The procurement and processing of new fuel for DCPP was being well managed, and contracts were in place to supply all the new fuel needed to support operations through the end of the period of extended operations in 2030.

Innovations Initiatives

- Clarified Current Planned Use of Artificial Intelligence (AI) at DCPP
  - Neutron Enterprise generates new information in that it provides intelligent summaries of stored information database.
  - It cannot generate information outside of the stored information database.
  - June 2025 is the target for availability for employee use.
- Several Future Uses of AI Under Consideration
- Any New Uses Will Follow NRC Guidance (Evolving)

(continued)

Innovations Initiatives (continued)

Conclusion: The use of an Artificial Intelligence platform named Neutron Enterprise for document and data search, retrieval, and reporting continued to be positive. There were no safety concerns associated with DCPP's current plans for the possible use of Artificial Intelligence at the station.

Recommendation: The DCISC's previous recommendation was reviewed in this report and remains open [the DCISC should frequently review the use of Artificial Intelligence (D12/24FF-3.4)]. Also, the FFT recommended that the DCISC create a list of potential future Artificial Intelligence applications that could enhance safety under item PI-3 on its Open Items List.

Refueling Outage 1R25 Update and Safety Plan

- Update on 1R25 Schedule and Scope
- Update on Capsule B Retrieval (Primary and Backup Plans)
- Reviewed Outage Safety Plan and Schedule

Conclusion: DCPP's preparations for Refueling Outage 1R25 and the retrieval of Reactor Vessel neutron embrittlement sample Capsule B appeared to be progressing satisfactorily.

Nuclear Safety Oversight Committee Exit Meeting

- External Committee of Five Outside Executive-Level Industry Peers
- Advises the Chief Nuclear Officer on Safety Policy and Provides an Independent Perspective on Plant Performance
- Typically Meets and Visits DCPP Three Times per Year
- Observed Exit Briefing In-Person

Conclusion: The NSOC appeared to be thorough and comprehensive in their evaluations and candid in their reports.

Meeting with San Luis Obispo County Department of Emergency Services

- Met with Ms. Kelly Van Buren, Nuclear Power Plant Program Manager
- Reviewed Organization and Roles of County Emergency Planning Staff
- Relationship Good Between County and DCPP
- Discussed Possible Future Changes to DCPP Emergency Planning
- Discussed the DCISC's Development of a Policy for Responding to Emergencies at DCPP

Conclusion: Visit was beneficial to learn about the status of the county's emergency preparedness programs and to discuss the role of the DCISC.

Recommendation: The DCISC should continue its effort to develop a committee policy for responding to an emergency declaration at DCPP (D3/25FF-3.12).

Per Peterson, Member, with Richard McWhorter, Consultant

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Najmedin Meshkati, Member, with Richard McWhorter, Consultant

Tom Jordan, Michael Oskin, and Scott Marshall, Seismic Review Team Consultants

1. Site Tour to View Geologic Formations
2. Seismic Review Team Question and Answer Session with PG&E Geosciences Staff
3. Plant Tour

Site Tour to View Geologic Formations

- From Access Road – Marine Terraces
- From Access Road – Rock Formations Along the Coast and in the Irish Hills
- At Avila Beach – Rock Formations Where San Luis Bay Fault Appears at Surface

Conclusion: The DCISC's Seismic Review Team and Fact-Finding Team observed geologic formations near DCPP that were significant to understanding faults underlying the Irish Hills, including inspecting rock formations at surface locations of the San Luis Bay Fault.

SRT and FFT Observing Rock Layers Indicative of Shoreline Fault at Avail Beach

SRT Observing Rock Layers Indicative of Shoreline Fault Along Avila Beach Drive

Seismic Review Team Question and Answer Session with PG&E Geosciences Staff

- Topics Discussed Included:
  - Status of the DCPP Seismic Source Characterization Model
  - Marine Terrace Uplift Data
  - Fault Geometry
  - Geodetic Data
  - Seismic Source Characterization Model
  - 2024 Noto Peninsula Earthquake Information and Its Applicability to DCPP

(continued)

Seismic Review Team Question and Answer Session with PG&E Geosciences Staff (continued)

Conclusion: The DCISC's Seismic Review Team and Fact-Finding Team met with PG&E staff to discuss several technical questions regarding site geology and PG&E's seismic evaluations. Conclusions drawn from the information provided will be included in the team's report scheduled to be completed in June 2025.

Plant Tour

- Toured Turbine Building:
  - Operating Deck
  - Lower Level
- Observed Seismic Structures and Bracing

Conclusion: The DCISC's Seismic Review Team and Fact-Finding Team toured the DCPP Turbine Building to observe the general arrangement and specific examples of seismic support structures.

SRT and FFT and Unit 1 High-Pressure Turbine

Najmedin Meshkati, Member, with Richard McWhorter, Consultant

Tom Jordan, Michael Oskin, and Scott Marshall, Seismic Review Team Consultants

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Review of the Bird Critique

Seismic Review Team

Thomas H. Jordan

Michael E. Oskin

Scott T. Marshall

Presentation at the Diablo Canyon Independent Safety Committee Public Meeting

June 10, 2025

Seismic Review Team

- **Thomas H. Jordan**
  - Professor, Department of Earth Sciences, University of Southern California
- **Michael E. Oskin**
  - Professor, Earth and Planetary Sciences Department, University of California Davis
- **Scott T. Marshall**
  - Professor, Department of Geological and Environmental Sciences, Appalachian State University

Charge to the Seismic Review Team by the DCISC

- Conduct a peer review of reports submitted by Dr. Peter Bird to the DCISC, CPUC, and NRC regarding the seismic hazard at DCPP
  - Main report by Dr. Bird:

    "High Seismic Hazard and Risk at Diablo Canyon Power Plant Due to Thrust Faulting Under the Irish Hills" (27 pp.), submitted to the DCISC on October 30, 2024

- Evaluate Dr. Bird's assertions using the best science available from the published literature, public PG&E reports, and expert knowledge
  - Submit a written report on the SRT findings and recommendations to the DCISC by May 30, 2025

Four Main Assertions of the Bird Critique

a. PG&E (2015, 2024) underestimated the hazard to DCPP from thrust faulting under the Irish Hills because it made four false assumptions. Removing these assumptions increases the thrust-faulting potency rate by a large factor.

b. Three independent analytic methods give values for the total slip rate on shallow-dipping thrust faults under the Irish Hills in the range of 2.0-2.8 mm/yr.

c. January 1, 2024, Noto Peninsula (Japan) earthquake (M7.5) is a good analog for a large thrust event beneath the Irish Hills

d. Recurrence interval of a Noto24-type earthquake involving Irish Hills thrust faulting is 715-1000 yr, posing an unacceptable risk to the DCPP.

Four Main Assertions of the Bird Critique

a. PG&E (2015, 2024) underestimated the hazard to DCPP from thrust faulting under the Irish Hills because it made four false assumptions. Removing these assumptions increases the thrust-faulting potency rate by a large factor.

False Assumptions
1. The Irish Hills are uplifting as a rigid block, with no internal deformation
2. Active thrust faults may dip at any angle
3. Geologic structures older than ~0.33 Ma are irrelevant to seismic hazard estimation
4. GPS geodetic velocities are not useful for site-specific seismic hazard estimation

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Method	Bird slip rate (mm/yr)
1. Isostatic	2.8
2. Thrust fault heave rate	~2
3. GPS geodetic horizontal shortening rate	2.2

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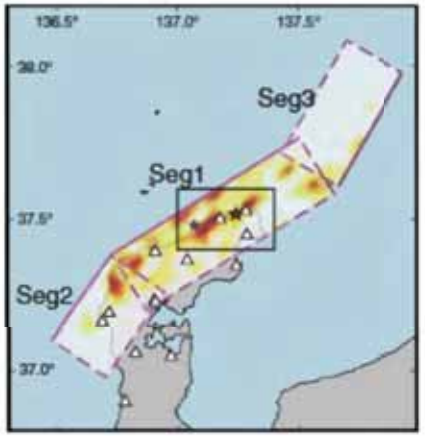
Xu et al. (2024)



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Outline of the SRT Report

1. Introduction
   - SRT charge, review process
2. Annotated summary of the Bird critique
   - Point-by-point commentary on text of Bird critique
3. Technical analyses
   - Gravimetric data
   - Fault reactivation
   - Fault system geometry and kinematics
   - Geodetic data and models
   - 2024 Noto Peninsula analog earthquake
4. Findings and recommendations
   - 15 major findings and 9 recommendations for future work

Review Process by SRT

- Reviewed six of Dr. Bird's filings and evaluated his assertions based on published literature, public PG&E reports, and expert knowledge
  - Began review on February 20, 2025
  - Paced progress with weekly on-line meetings
  - Submitted final report (98 pp.) to the DCISC on May 30, 2025
- Consulted widely with subject-matter experts, including
  - Dr. Peter Bird (on-line March 18, 2025)
  - PG&E representatives (in-person at DCPP on March 28, 2025)
  - IPRP technical team assessing the Bird critique (on-line April 25, 2025)

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Annotated Summary of the Bird Critique

- Point-by-point SRT commentary on text of Bird critique
  - Bird text in **blue font**, taken primarily from 10/30/24 filing with DCISC
  - SRT comments and analysis in **black font**
- We frequently reference technical analyses of Section 3 in support of the commentary

Seismic Review Team Report

2.2. Four False Assumptions in the Development of SSC15 and SSC24

a. One of the reasons that the SSC15 and SSC24 reports seriously underestimated seismic hazard due to thrust faulting is that they were guided by four assumptions that are actually false.

The assumptions stated by Dr. Bird involve simplifications and generalizations that go beyond the hypotheses that actually guided PG&E in the development of the SSC model, as discussed below.

2.2.1. "The Irish Hills are uplifting as a rigid block, with no internal deformation."

a. PG&E assumed that the Irish Hills are uplifting as a rigid block, with no internal deformation.

While it is true that the fault-based sources used in the SSC are consistent with block uplift of the Irish Hills, it is not correct to say that PG&E assumes that there is no internal deformation. Transpressive internal deformation is modeled by a Local Areal Source Zone that produces 70% strike-slip sources with magnitudes up to 7.0 and dips that range from 90° to 65°, and 30% reverse-slip sources with magnitudes up to 7.1 and dips that range from 70° to 35° (PG&E, 2015, sect. 13.5). The disaggregated hazard curves in Figure 2.1 show that the contribution of the Local Areal Source Zone to the exceedance rate measured at an SHz-SA = 1 g is the second largest, only the Hosgri source is larger. At SHz-SA = 2 g, Hosgri accounts for 45%, SWBZ for 17%, and the Local Areal Source Zone for 15%, tying with the Los Osos Fault in third place.

b. From this assumption, PG&E concluded that thrust faulting occurs only at the margins (Los Osos thrust, San Luis Bay thrust) with fault throw rates equal to marine terrace uplift rates of ~0.2 mm/year, and that thrust faulting occurs nowhere else.

The statement that thrust faulting occurs nowhere else is not correct, because the Local Areal Source Zone includes widely distributed reverse-slip sources. These sources are consistent with the internal structure of the Irish Hills, where geologic mapping indicates minor inversion of normal faults inherited from an earlier period of crustal extension, producing reverse slip and forced folds above steeply dipping (> 60°) faults. None of these internal structures produces measurable offset of marine terraces or other youthful geomorphic features (Hanson & Lettis, 1994, PG&E, 2014a). Such evidence occurs only at the margins of the Irish Hills along the Los Osos trend and along various onshore and offshore strands of the SWBZ (Lettis & Hall, 1994, Lettis et al., 1994).

c. However, the geologic map of the Irish Hills shows tight folding of Late Miocene sedimentary rocks has occurred since 6 ~ 5 Ma. Therefore, the Irish Hills are not rigid, and additional blind thrust faults are active in the interior.

Seismic Review Team Report

Tight folds are defined by interlimb angles less than 30°, implying more than 50% shortening. The map-scale folds expressed in the Irish Hills are open folds, with interlimb angles greater than 70° (PG&E, 2014a; Weigers, 2021). Tight folding is present at outcrop-scale, especially within the Monterey formation, and is attributed to shortening as a result of flexural-slip folding. The estimated internal shortening ranges from 3.4% to 8.7% across the axis of the Pismo Syncline (PG&E, 2014a). The uniform elevation of marine-terrace platforms across these fold axes (Figure 2.2) shows that these folds are not presently tightening within the resolution of these reference horizons. Any model to produce the Pismo Syncline via ongoing fault-related folding must account for both the total deformation across the syncline and the ongoing surface deformation evident only at the northern and southern boundary of the Irish Hills (See §3.3). The Local Areal Source Zone is intended to represent the internal deformation of the Irish Hills and the possibility of blind-thrust sources.

d. According to geological mapping, the sedimentary beds in the Pismo have been rotated ~45°. This folding began after deposition of the youngest strata in the core of the fold (Tmpm), and prior to deposition of the Squire Member of the (Pliocene) Pismo Formation (Tpps), probably circa 5 Ma.

This statement is consistent with the geologic map relationships expressed within the Irish Hills and western San Luis Range.

e. This folding implies upper-crustal strains of ~0.8, and mean strain-rates of ~0.8 / 5 Ma = 5×10^{-15} per second, which is ~10× faster than rates of deformation of the modeled faults that are typical in the long-term neotectonics of the western U.S.

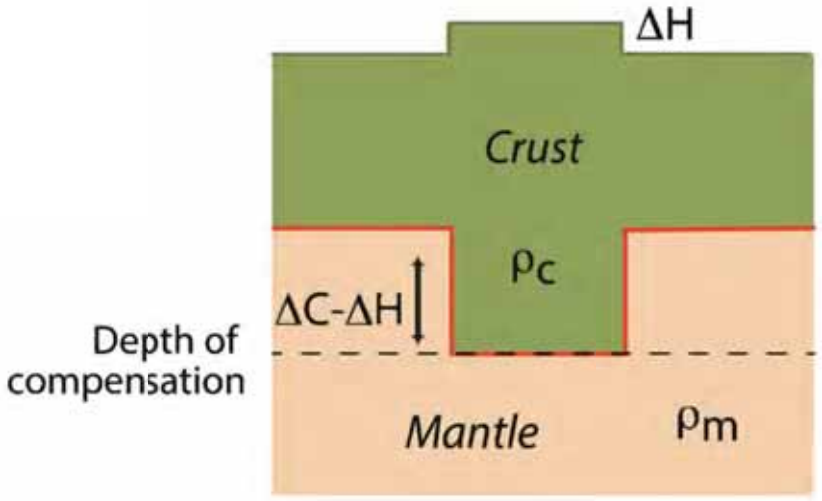
The 0.8 / 5 Ma strain estimate is equivalent to 160 nanostrain/yr, which is typical within the plate-boundary deformation zone along the entire length of the San Andreas fault (see Zeng, 2022, fig. 9). In a discussion with Dr. Bird, the SRT clarified that his estimate is a shear strain rate based on the ~40° tilt of the limbs of the Pismo Syncline with respect to horizontal. It should be recognized that the cumulative strain expressed as folding is not identical to the present pattern of strain accumulation evident in geodetic data and patterns of marine-terrace uplift. Reconciling these differences requires a kinematic model of fold growth in relation to underlying fault geometry, and consideration of the differing time frames for each type of measurement (see §3.3). The time-averaged strain rate since 5 Ma is not necessarily the same rate implied by Q2 marine-terrace uplift over the past 124.0 ± 2.5 ka (Marine Isotope Stage 5e highstand age from Simms et al., 2016). The analysis in §3.3 suggests that the 5-Ma rate is greater than the 120-ka rate.

Outline of the SRT Report

1. Introduction
   - SRT charge, review process
2. Annotated summary of the Bird critique
   - Point-by-point commentary on text of Bird critique
3. Technical analyses
   - Gravimetric data
   - Fault reactivation
   - Fault system geometry and kinematics
   - Geodetic data and models
   - 2024 Noto Peninsula analog earthquake
4. Findings and recommendations
   - 15 major findings and 9 recommendations for future work

Gravimetric Analysis

- Bird's assertion: Active thrust faulting must explain not only the 0.2 mm/yr uplift rate of the Irish Hills but also a crustal thickening rate about six times larger.
  - Assumes mass compensation mechanism is Airy isostasy, where the local topographic height is balanced by the local Moho depth



Airy Compensation Model

$$\rho_c \approx 2.75\ \mathrm{gm/cm^3}$$

$$\rho_m \approx 3.30\ \mathrm{gm/cm^3}$$

$$\Delta C = \frac{\rho_m}{\rho_m - \rho_c}\Delta H \approx 6\,\Delta H$$

Crustal thickening rate is 6 times the uplift rate

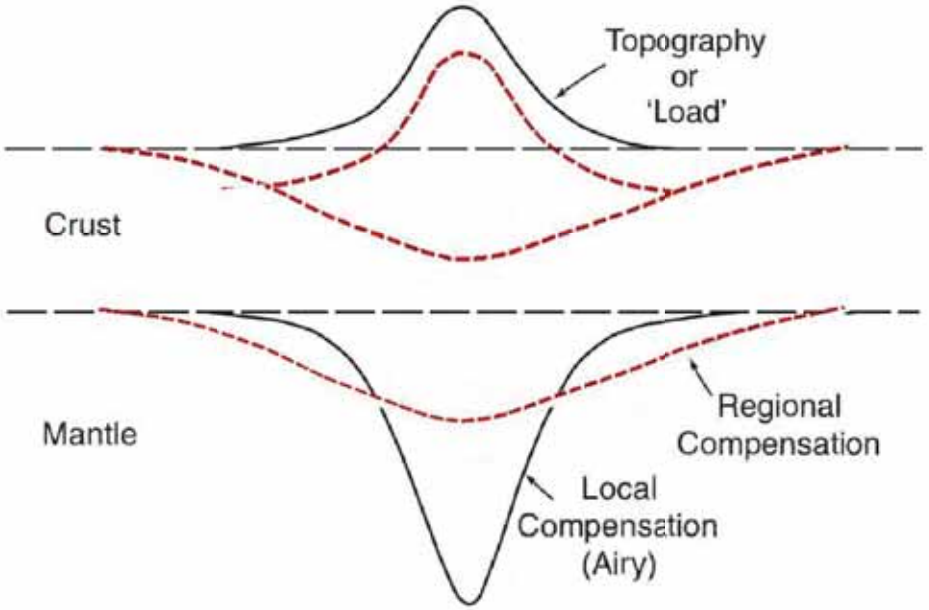
Lamb et al. (2020, fig. 1)

Gravimetric Analysis

- Regional compensation is the most realistic and widely applied isostatic model
  - Loads are supported by the flexural rigidity of the lithosphere, parameterized by T_e

$T_e \to 0$ Airy (weak plate) compensation

$T_e \to \infty$ Bouguer (strong plate) compensation



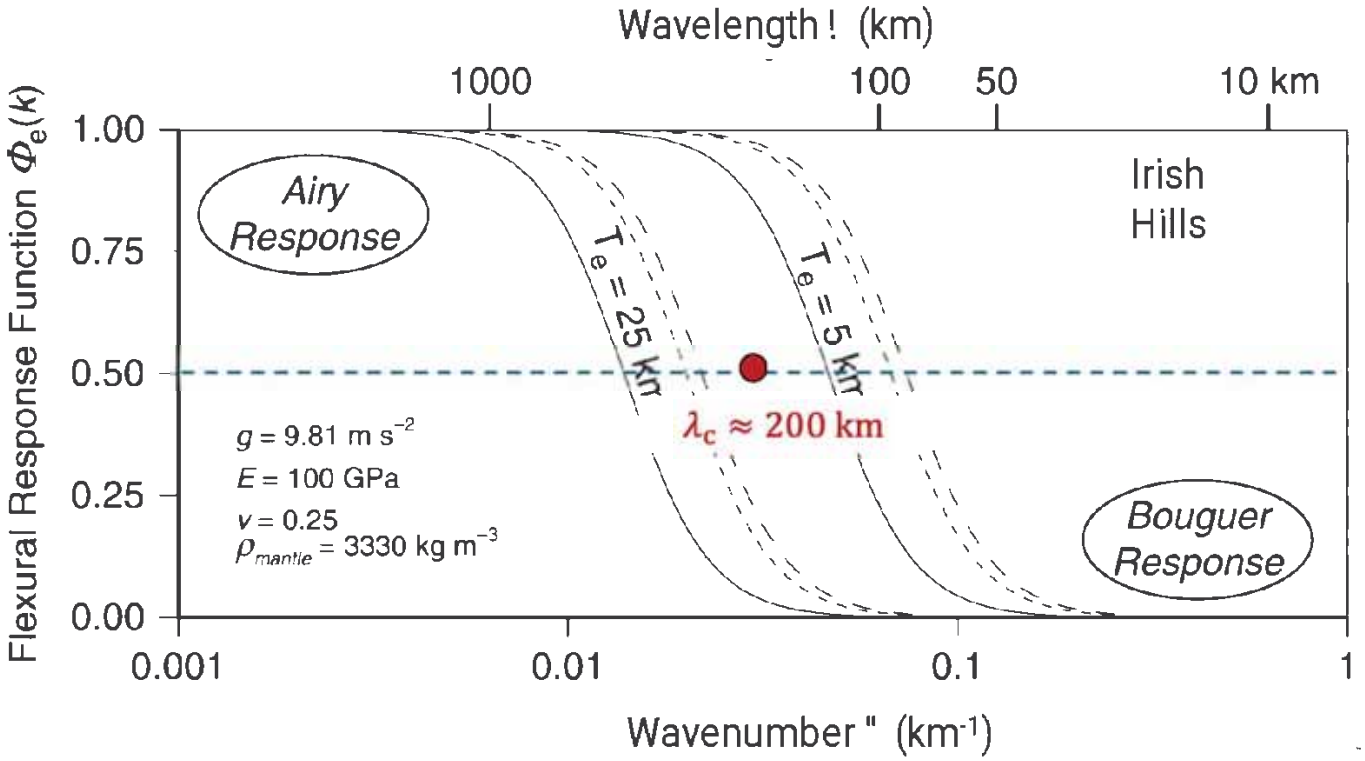
- Flexural rigidity spreads out compensation and reduces Moho depression
- For Irish Hills:

$T_e \approx 10$ km

$\lambda_c \approx 200$ km

Gravimetric Analysis

- From the gravimetric analysis, the SRT concludes that
  a. Airy isostasy cannot be applied to the compensation of loads of as small as the Irish Hills (15 × 25 km)



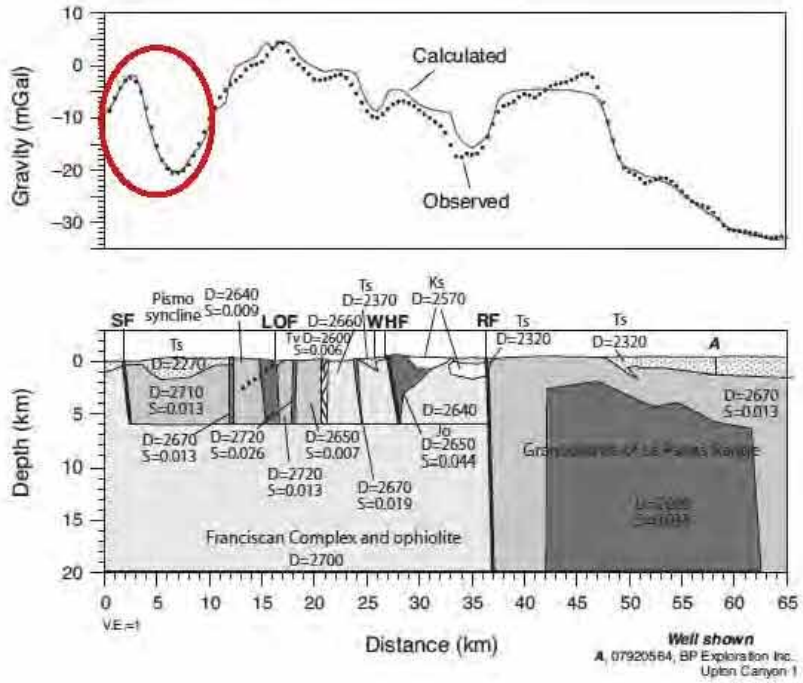
$T_e \approx 10$ km
$\lambda_c \approx 200$ km

Watts (2023, fig. 5.2)

Gravimetric Analysis

- From the gravimetric analysis, the SRT concludes that
  a. Airy isostasy cannot be applied to the compensation of loads of as small as the Irish Hills
  b. Gravity anomalies associated with the Pismo Syncline and Irish Hills can be successfully explained by plausible models based on Bouguer (rigid plate) compensation without Moho variations

"20 mgal Pismo Syncline anomaly"



Langenheim et al. (2012, fig. 10)

Langenheim et al. (2012): *"Isostatic residual gravity anomalies reflect density variations in the upper 10-15 km with one of the most prominent density contrasts being that between low-density Neogene sedimentary rocks and dense Mesozoic basement rock types."*

Gravimetric Analysis

- Bird assertion: Simple Airy isostasy implies that the ratio of crustal thickening to topographic rise is about 6. Therefore, a simple isostatic model for the total rate of thrust-fault slip under the Irish Hills is at least:

  (0.2 mm/yr uplift) × 6 / sin(25°) = 2.8 mm/yr (Bird's Method #1)

- For small areas such as the Irish Hills, the response to surface loading is Bouguer, not Airy. Hence, the factor of six in the above equation reduces to unity, and the slip rate becomes

  (0.2 mm/yr)/sin(25°) = 0.47 mm/yr

- This rate is further reduced if the average SWBZ dip of 38° is used:

  (0.2 mm/yr)/sin(38°) = 0.32 mm/yr

- Best estimate: 0.29 ± 0.07 mm/yr, based on an uplift rate of 0.18 ± 0.03 mm/yr

Fault Reactivation Analysis

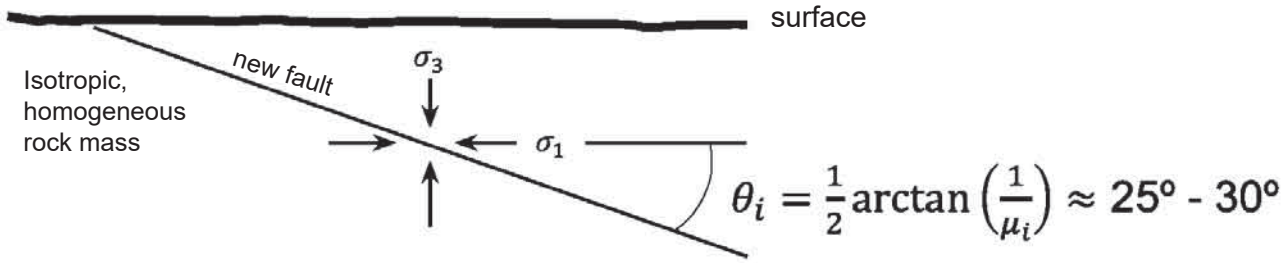
- Bird's assertion: High-angle reverse faulting in the SSC24 model is mechanically infeasible; faults with dips of 50^o-80^o are mechanically impossible in the present horizontal compressive stress regime

Mohr-Coulomb failure criterion:

$$\tau = C + \mu_i(\sigma_n - P_f)$$

Byerlee internal friction:

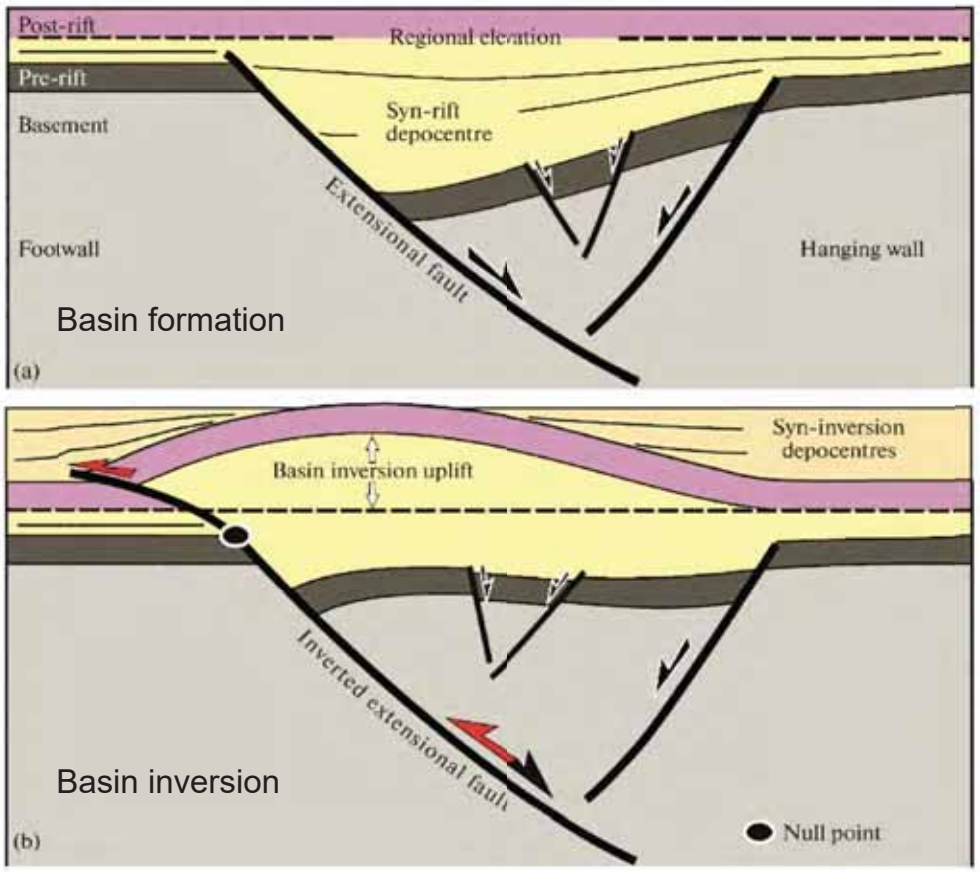
$$\mu_i \approx 0.60 - 0.85$$



- *The Mohr-Coulomb failure criterion for fault initiation assumes homogeneity and isotropy*
- *Does not apply to active fault systems, where most of the slip occurs on preexisting faults*

Fault Reactivation Analysis

- High-angle reverse faulting is commonly observed in inverted sedimentary basins around the world



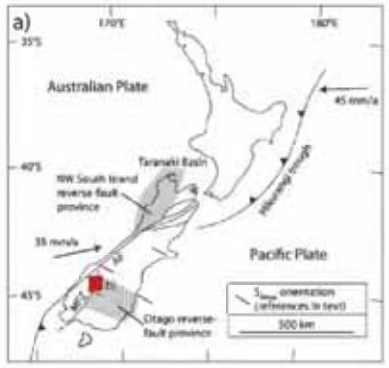
Zaidi & Ahsan (2024, fig. 1)

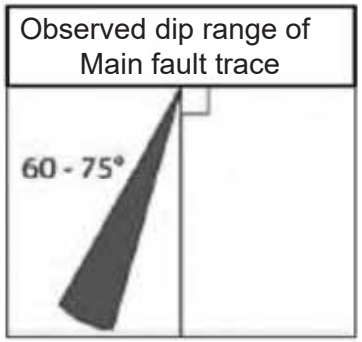
Fault Reactivation Analysis

- High-angle reverse faulting is commonly observed in inverted sedimentary basins around the world
- Example:

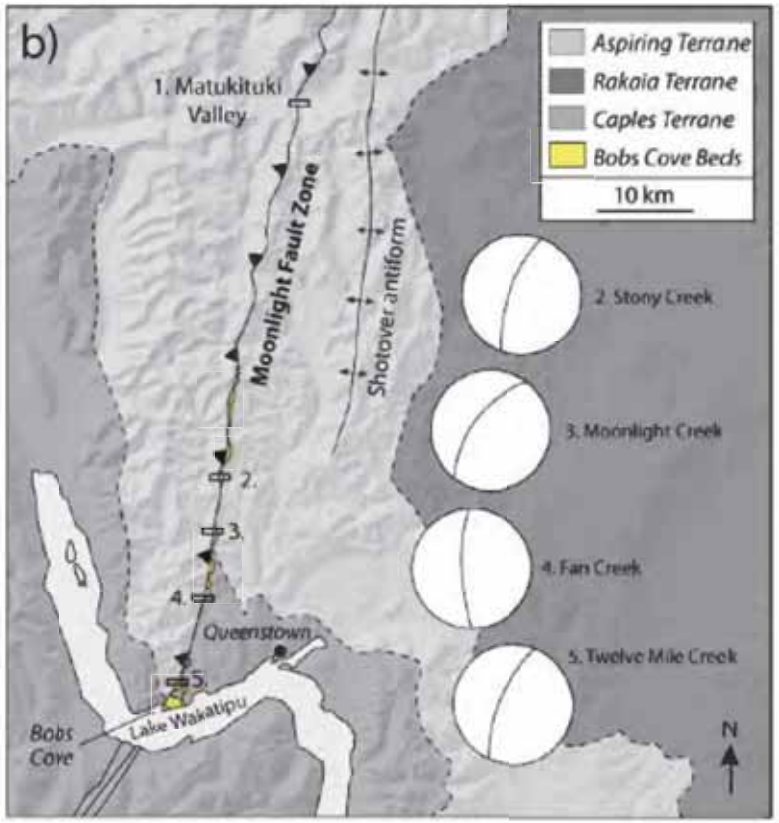
  Moonlight Fault Zone, NZ (Smith et al., 2017)

  – Transpressional regime similar to the Los Osos domain





Smith et al. (2017, fig. 1)

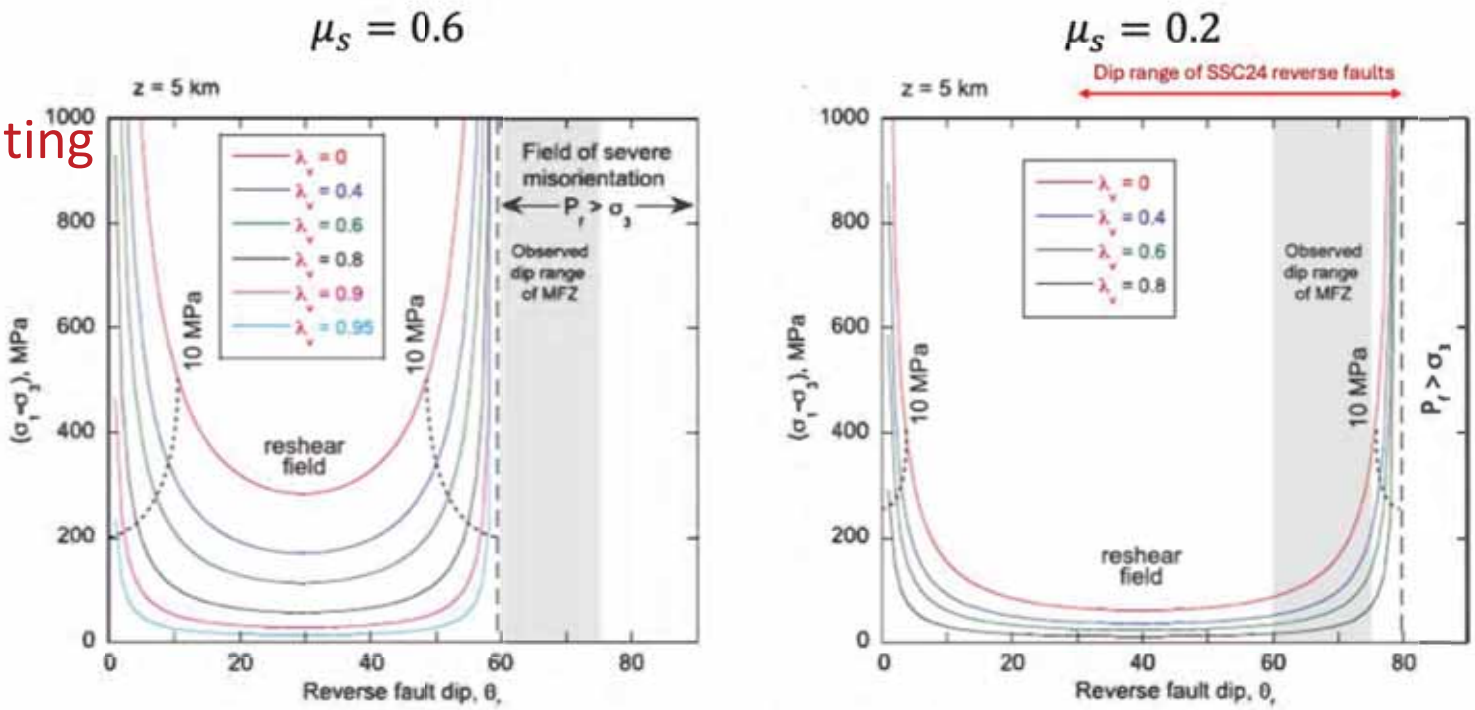


Smith et al. (2017) measured the static friction of phyllosilicate-rich fault gouge exhumed from the fault core and obtained very low friction coefficients ($0.19 < \mu_s < 0.25$).

Fault Reactivation Analysis

High-angle reverse faulting promoted by:

1. High pore pressure
2. Weak fault gouge
3. Oblique slip



SRT finding: *Reverse faulting at dips of 50°-80° is mechanically feasible in the transpressive regime of the Irish Hills*

Pore fluid factor: $\lambda_v = P_f/\rho gz$

Sibson (1989) fault reactivation criterion:

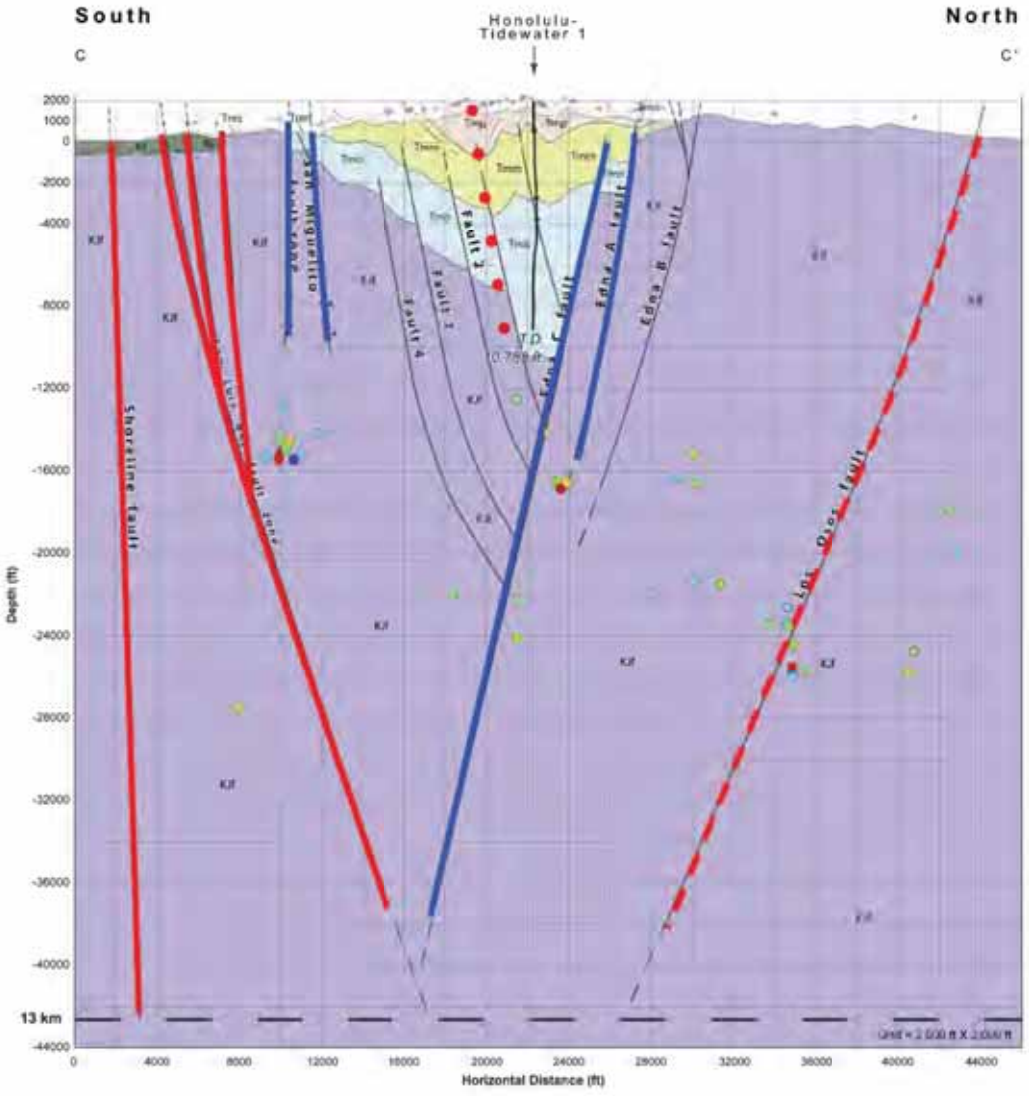
$$\sigma_1 - \sigma_3 = \mu_s \left(\frac{tan\ \theta_r + cot\ \theta_r}{1 - \mu_s \theta_r} \right) \rho gz(1 - \lambda_v)$$

Smith et al. (2017, fig. 6)

Fault System Analysis

Mike Oskin

Fault System Analysis



Structural Features of the Irish Hills
PG&E cross-section C-C'

- Pismo Rift Basin
  - Edna Fault
  - San Miguelito Fault
- Pismo Syncline
- Southwest Boundary Zone (SWBZ)
  - San Luis Bay Fault
- Shoreline Fault
  - Intersects SWBZ along strike
- Los Osos Trend

Fault System Analysis

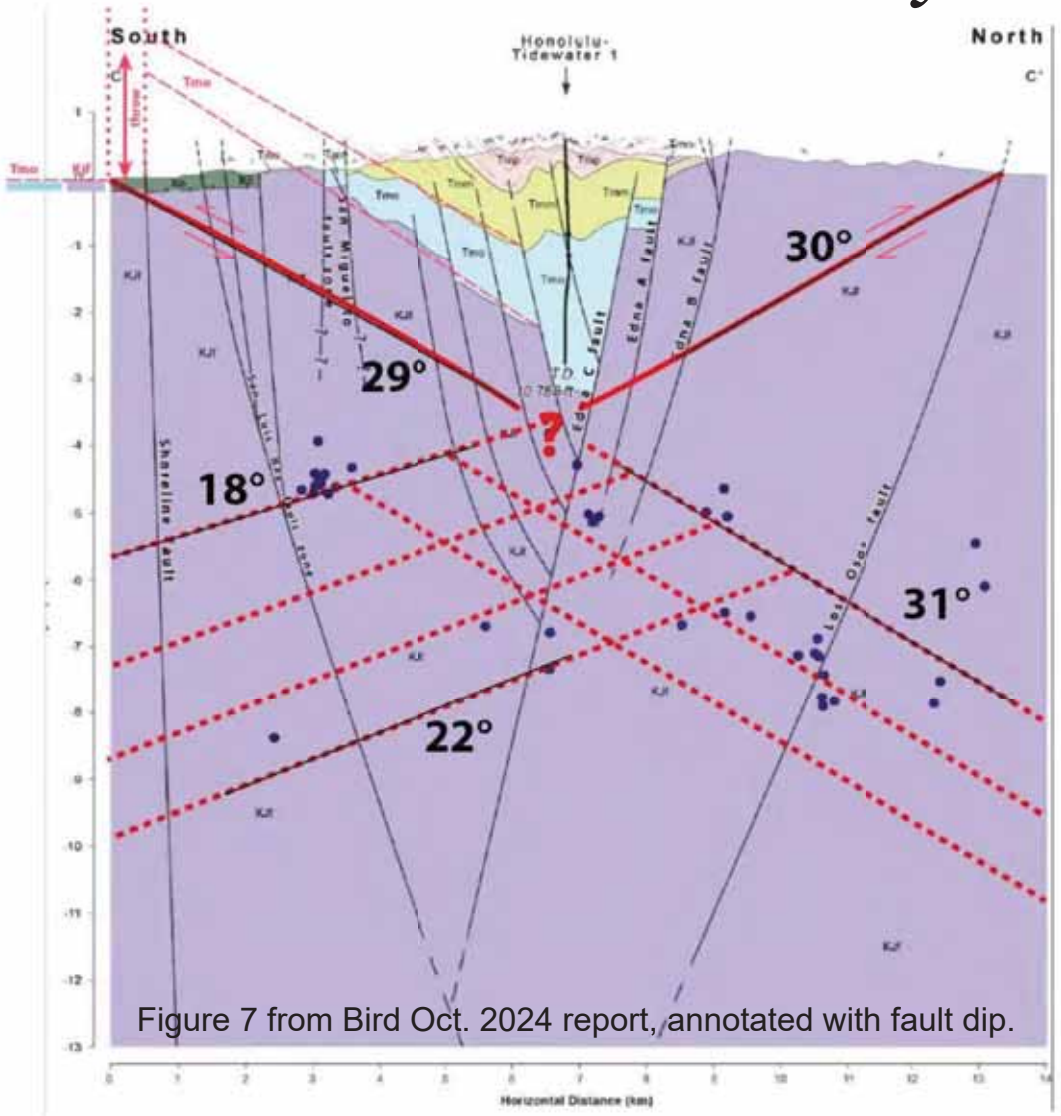
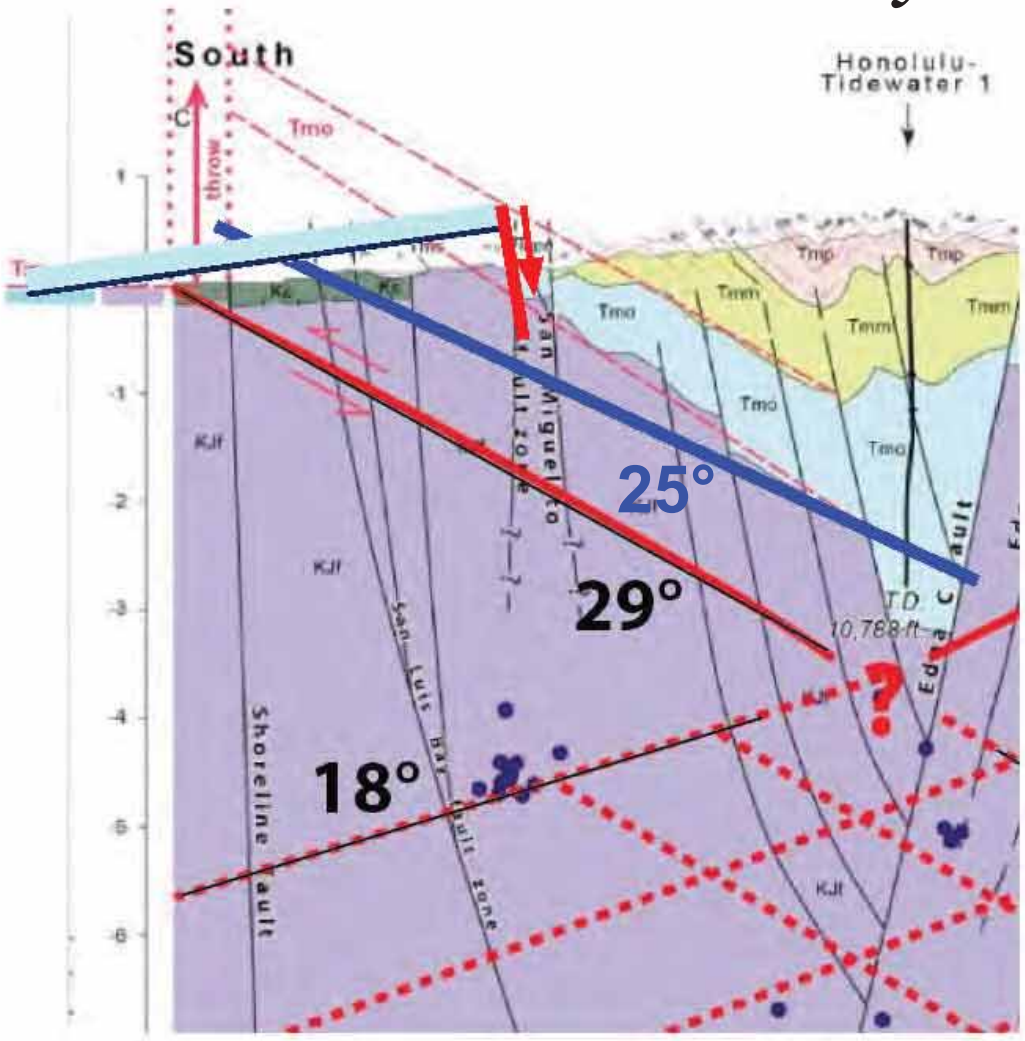


Figure 7 from Bird Oct. 2024 report, annotated with fault dip.

Bird Assertions:

- Thrust faults should dip 25° beneath the Irish Hills.
- Throw of the Obispo Formation at the San Luis Bay thrust fault is 1.6-2.2 km, implying 0.76-1.04 mm/yr.
- If thrusting has been symmetrical, then a minimum total thrust slip-rate would be 1.52-2.08 mm/year.
- This neglects internal blind thrusts,

Fault System Analysis



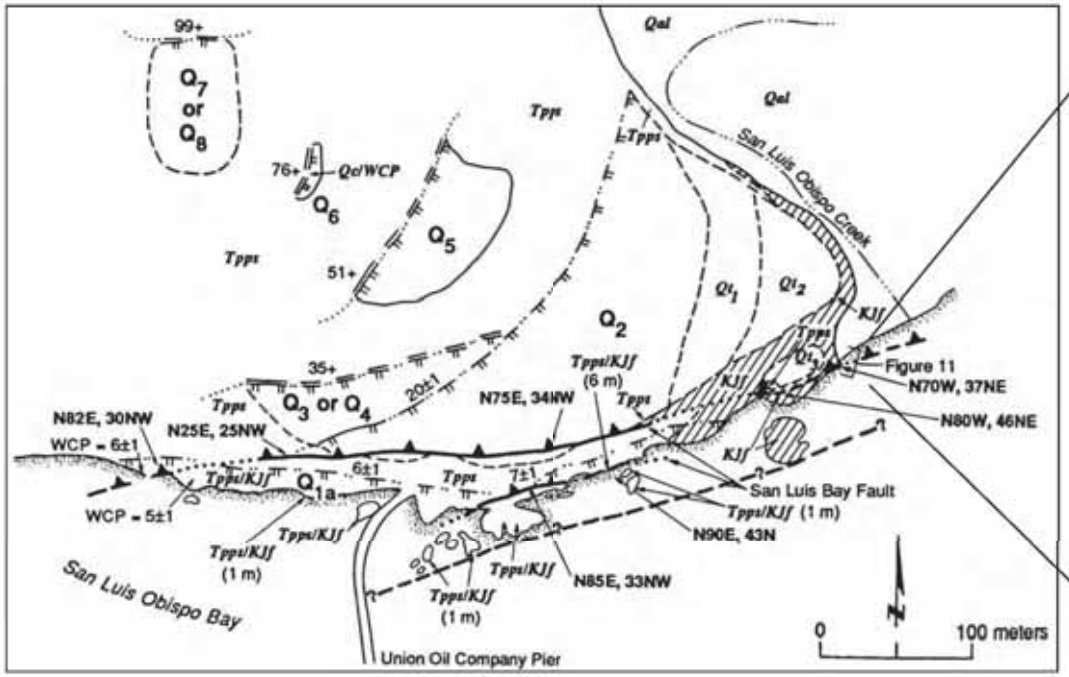
Excerpt from Figure 7 from Bird Oct. 2024 report, annotated with fault dip.

Bird Assertions:

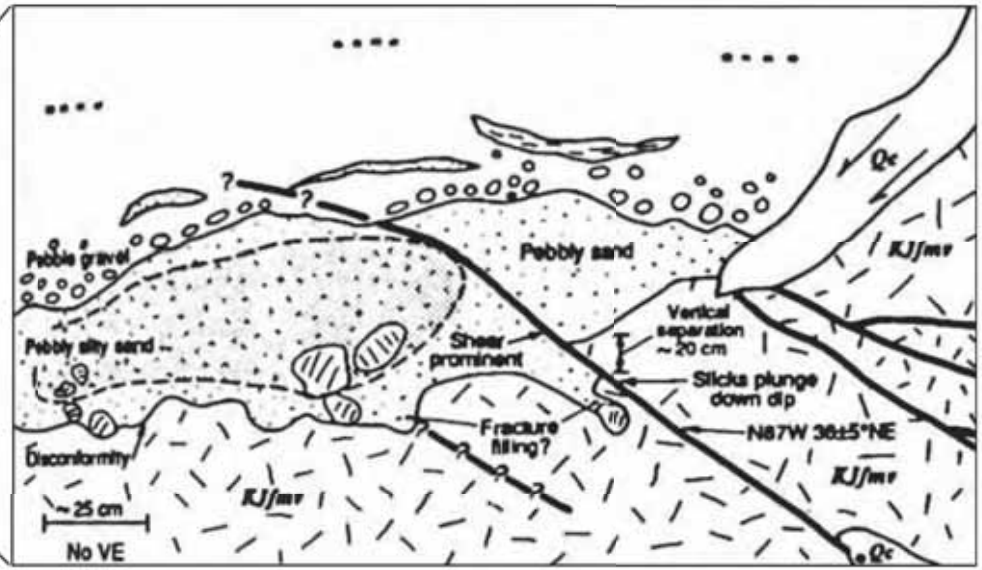
- Thrust faults should dip 25° beneath the Irish Hills.
  - A correctly positioned 25° fault dips less than the fold limb and would intersect well control within the Pismo basin.
- Throw of the Obispo Formation at the San Luis Bay thrust fault is 1.6-2.2 km, implying 0.76-1.04 mm/yr.
  - Normal slip across San Miguelito fault can explain this offset.

Fault System Analysis

- Field observations indicate Southwest Boundary Zone is moderately inclined, parallel to south limb of Pismo Syncline, dipping 38 ± 3° (standard error of mean)



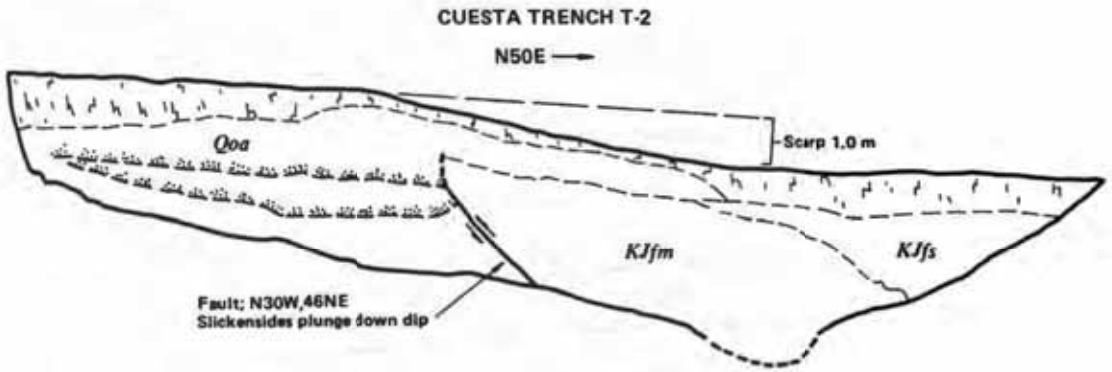
Map of San Luis Bay fault near Avila Beach
Dip measurements: 25, 30, 33, 34, 37, 43, 46°
Figure 10 from Lettis et al. (1994)



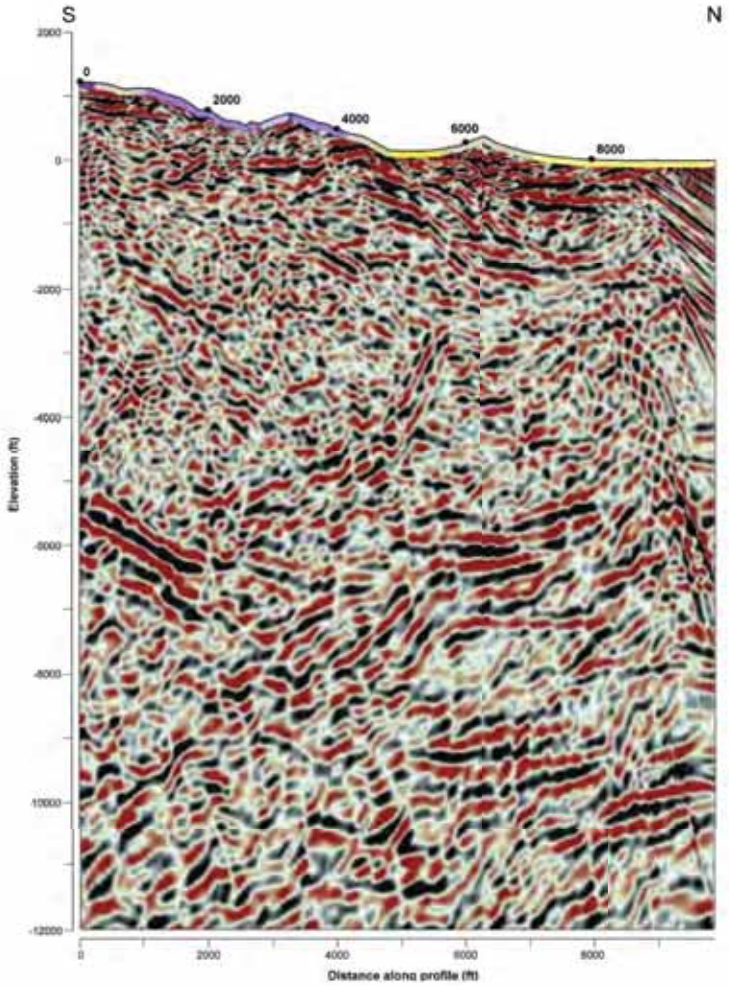
Outcrop log of San Luis Bay fault exposure, San Luis Obispo Creek. Dip: 38±5°
Figure 11 from Lettis et al. (1994)

Fault System Analysis

- Uplift associated with Los Osos Trend is not accompanied by clear evidence of thrust faulting. Evidence favors hinge line interpretation.



Trench exposures from Lettis and Hall (1994) reveal NE-dipping faults underlie NE-facing scarps, opposite expected thrust dip direction. NE-dipping faults may be formed due to folding-related flexure.



PG&E ONSIP imaging does not clearly reveal faults within Franciscan Melange.

Fault System Analysis

- Marine terraces constrain uplift pattern and slip rate of Southwest Boundary Zone

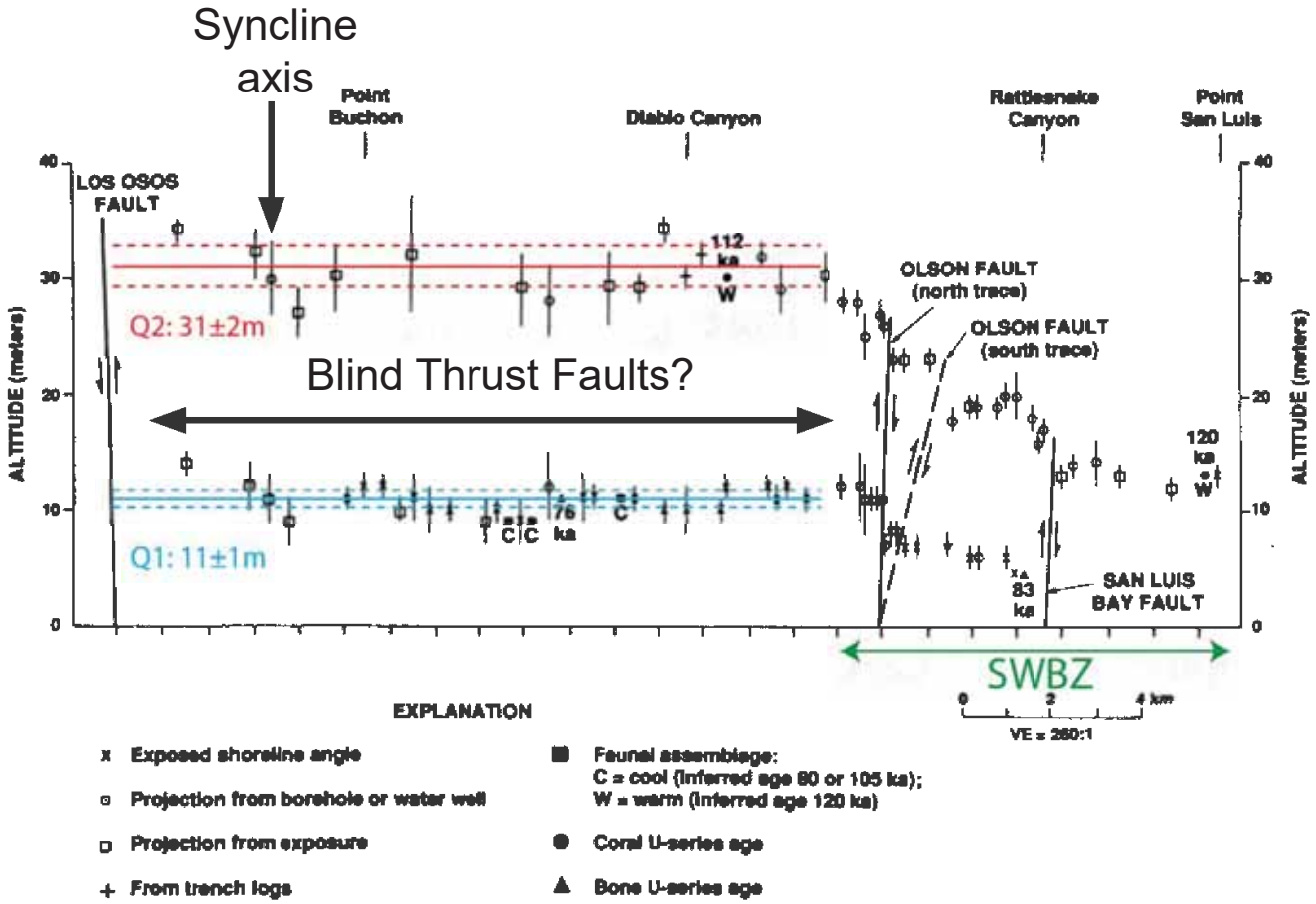


Figure 3 from Lettis & Hanson (1992), annotated to highlight uniform uplift of Irish Hills and warping associated with the Southwest Boundary Zone.

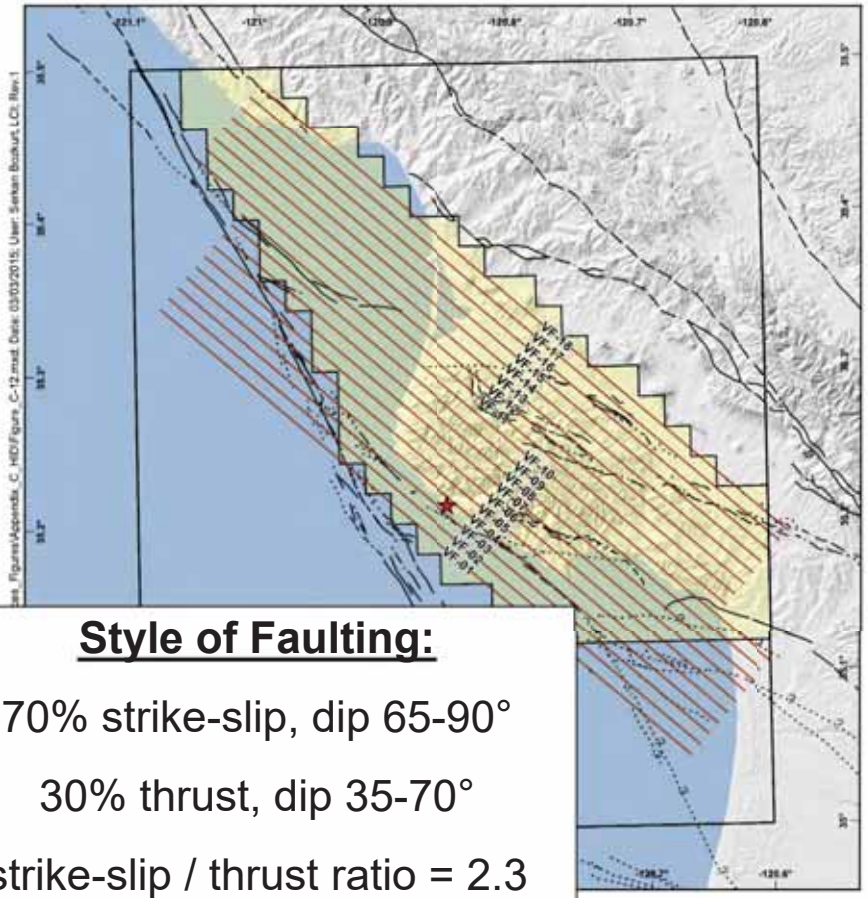
Q2 terrace constraints
Age: **124.0±2.5 ka**
Paleo-sea level:
6.0±1.5 m or **13.0±1.5 m**
(weighted equally)

Uplift rate: **0.18±0.03 mm/yr**

SWBZ slip rate: **0.29±0.07 mm/yr**
(38±3° fault dip)

Fault System Analysis

- The Local Areal Source Zone model accounts for possibility of a blind thrust rupture within the interior of Irish Hills, with a significant hazard contribution.

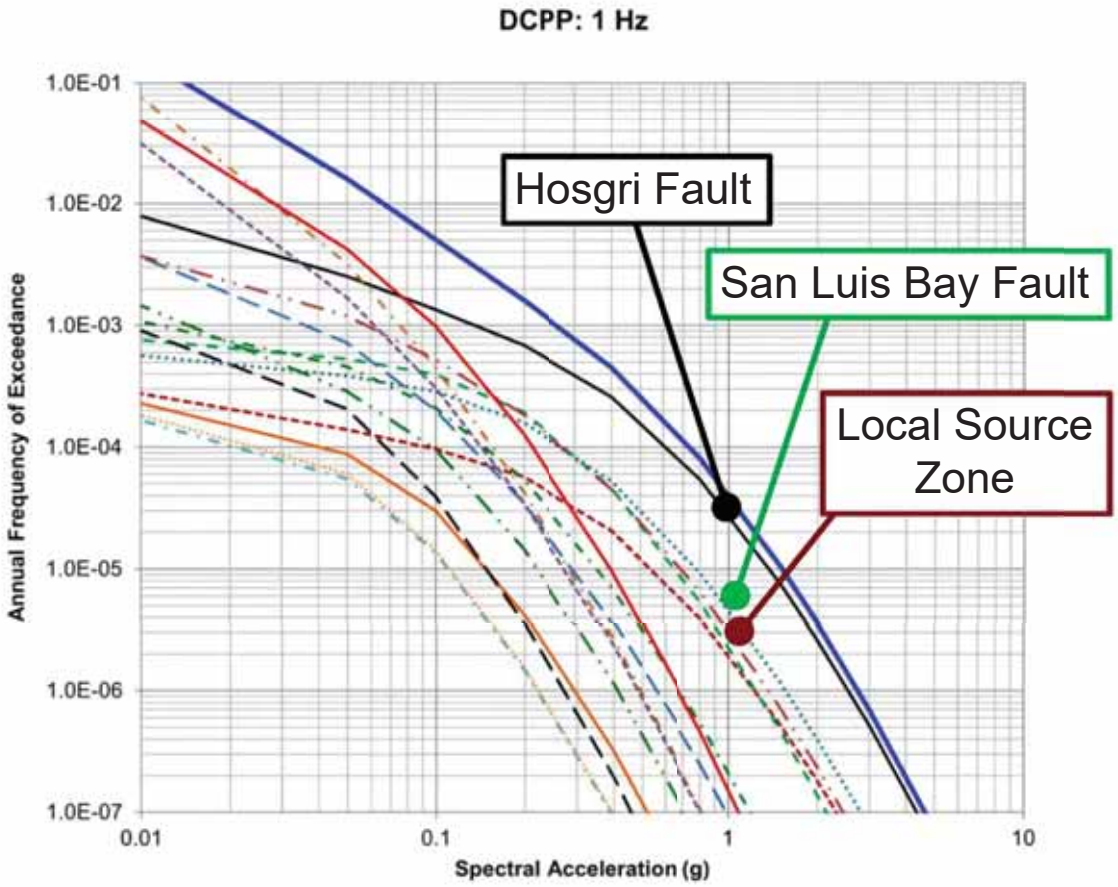


Style of Faulting:

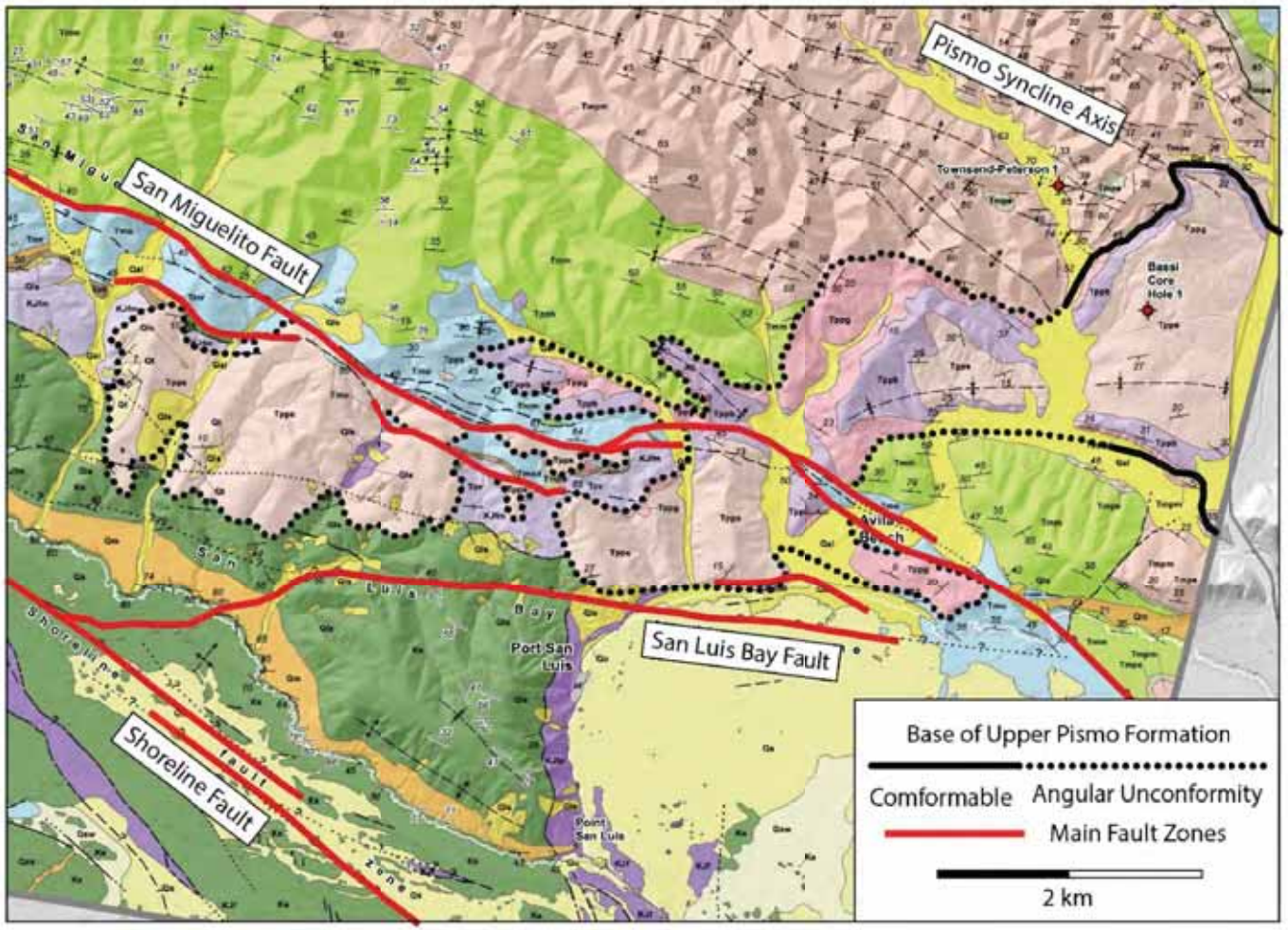
70% strike-slip, dip 65-90°

30% thrust, dip 35-70°

strike-slip / thrust ratio = 2.3

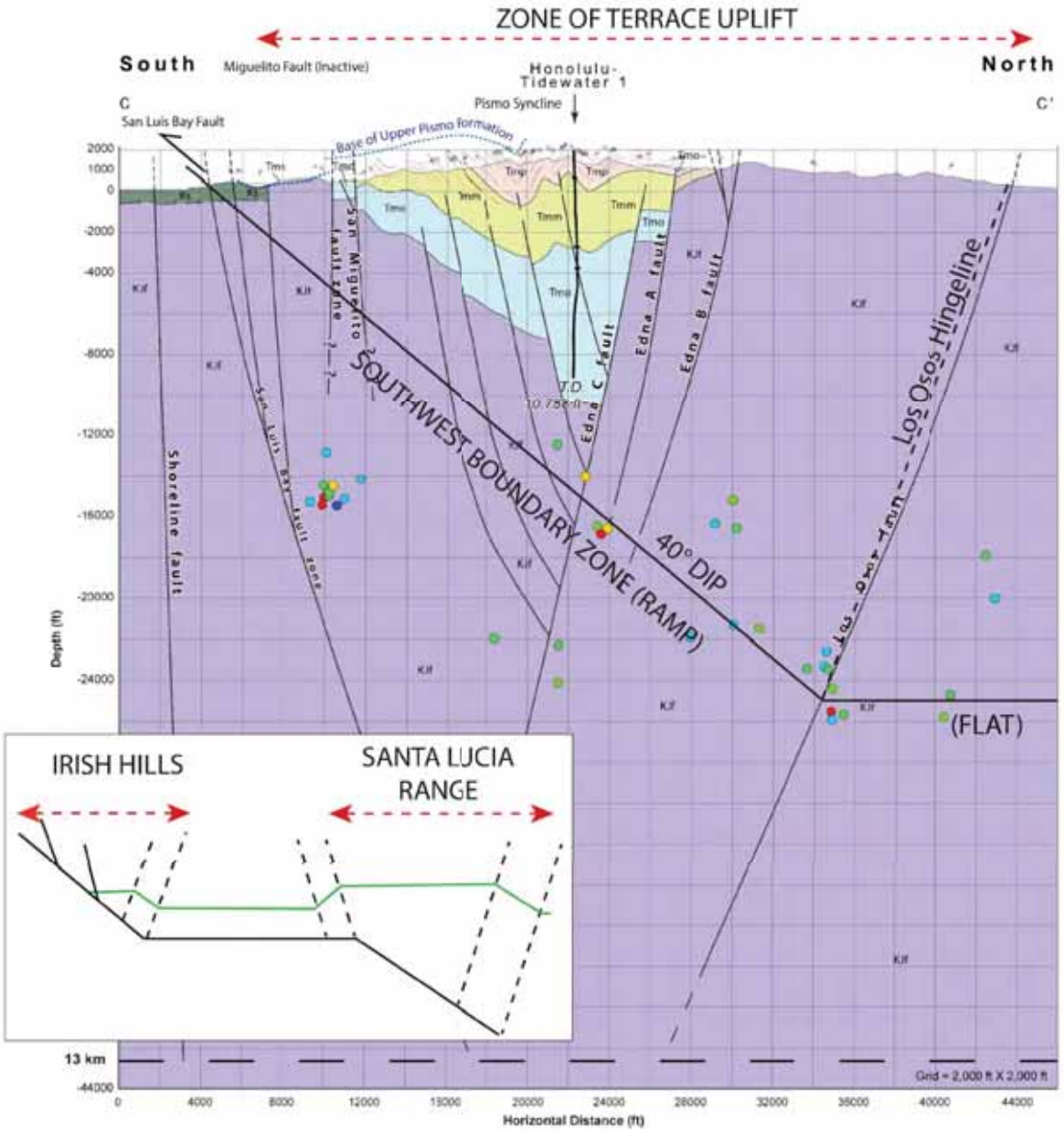


Fault System Analysis



Geologic Map Constraints

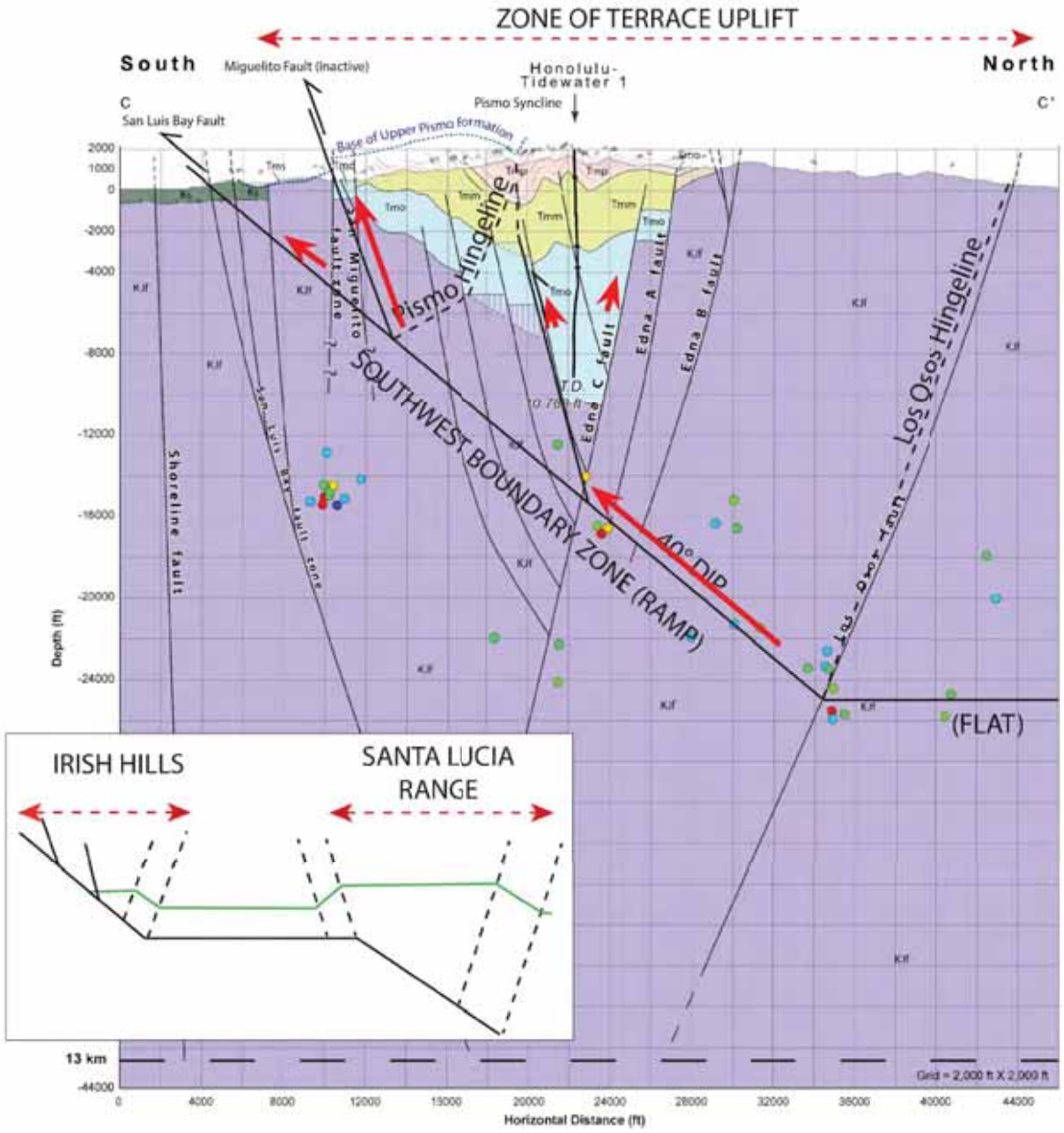
- Unconformity at base of Upper Pismo Formation records onset of folding at 5.1±0.4 Ma.
- San Miguelito fault is an inverted normal fault that bounds Pismo Syncline
- San Luis Bay fault cuts footwall of San Miguelito fault
- Preservation of these relationships implies limited SWBZ slip.



Fault System Analysis

Example Kinematically Constrained Fault Model, part I

- 40^{o} Dipping Southwest Boundary Zone
- Los Osos Hingeline formed by ramp-flat transition.
- Explains block-like uplift evident from marine terrace record.
- SWBZ may root beneath Santa Lucia Range, forming a second zone of marine terrace uplift.



Fault System Analysis

Example Kinematically Constrained Fault Model, part II

- 1.8 ± 0.2 km reverse slip on San Miguelito fault forms south limb of Pismo Syncline.
- San Luis Bay thrust, with 0.3-0.6 km slip, forms shortcut thrust, bypassing San Miguelito fault.
- North limb of Pismo syncline absorbs 0.3-0.4 km of slip.
- 2.6±0.3 km slip / 5.1±0.4 Myr yields 0.5±0.1 mm/yr slip rate.

Fault System Analysis

From fault system analysis, the SRT concludes:

- The geological structure of the Irish Hills indicates a moderate ($38^{o} \pm 3^{o}$) dip of the SWBZ, consistent with fault-outcrop observations and reactivation of steeply dipping normal faults in its hangingwall to fold the Pismo Syncline.
- The best estimate of the SWBZ slip rate during the last 124.0 ± 2.5 ka, inferred from the uplift rate of the MIS 5e marine terrace and the SWBZ dip, is 0.29 ± 0.07 mm/yr, which is about an order of magnitude smaller than the rates proposed by Dr. Bird.
- The long-term (5 Ma) slip rate of 0.50 ± 0.10 mm/yr inferred for the SWBZ from the kinematically constrained fault analysis is marginally higher than the short-term (120 ka) rate and significantly less than Bird's long-term rate of 2 mm/yr.

Fault System Analysis

From fault system analysis, the SRT recommends:

- Development of a set of kinematically constrained structural models for reverse faults underlying the Irish Hills that can explain the folding observed since 5 Ma.
- Dating of low-stand abrasion platforms offshore, south of the Irish Hills, to further constrain the rate of footwall subsidence and its contribution to the SWBZ slip rate.
- Monitoring of IRSL-dating efforts and reassessment, if necessary, of the MIS 5 age assignments for the Q1 and Q2 terraces surrounding the Irish Hills.
- Further investigation of potential strike-slip faulting along the Los Osos trend and its impacts on the pattern of marine-terrace uplift.

Geodetic Analysis

Scott Marshall

Geodetic Analysis

- **Bird Assertion:** PG&E assumes that GPS geodetic velocities are not useful for site-specific seismic hazard estimation.
- **SRT Finding:** "Whereas geodesy-based model slip rates are interpreted to be unreliable for use as direct inputs in the SSC model for DCPP, they are useful for comparison and to document whether there are large differences between results" (SSC24, p. 116).
- SSC15 analysis and review of geodetic data: sections 4.3.2.5 and 5.1.6

Table 5-11. Comparison of Fault Source Slip Rates, 2015 SSC Model and WUS ERF-2023 Deformation Models

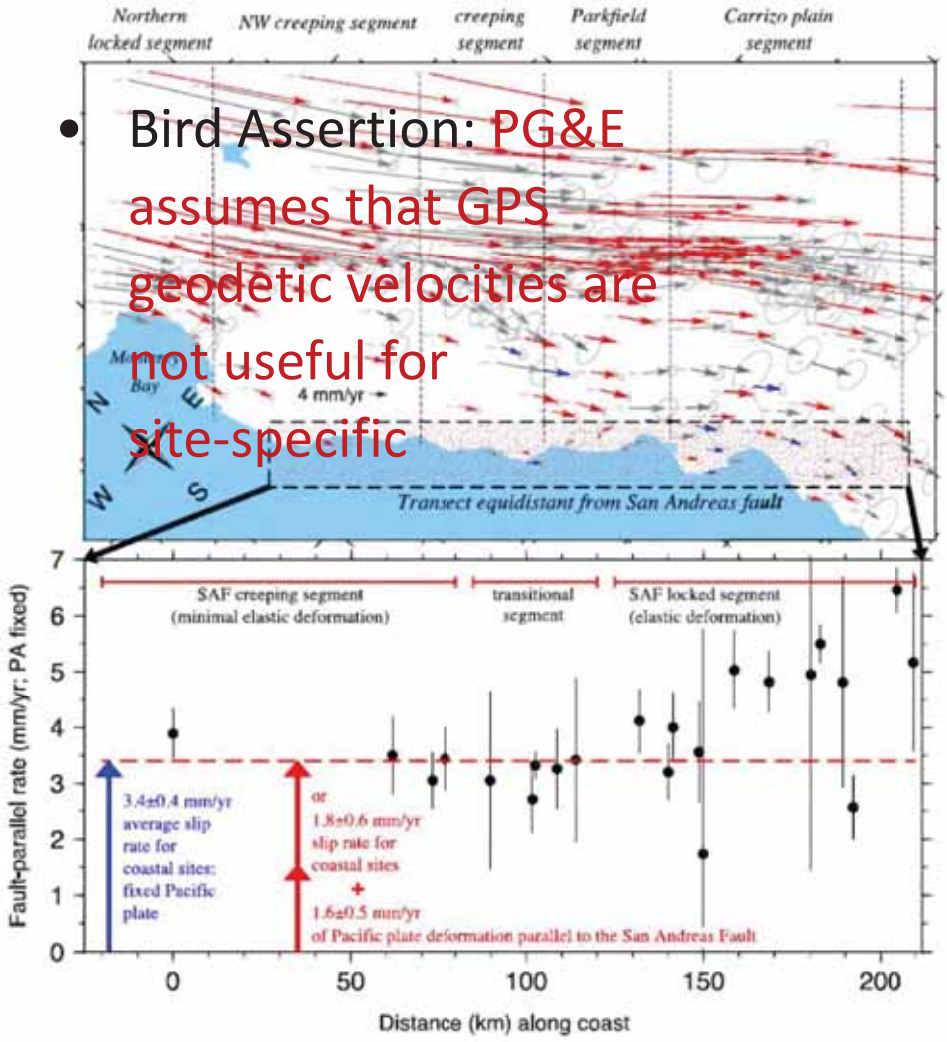
Fault Source	2015 SSC Model Rates (mm/yr)	WUS 2023-ERF Deformation Model Slip Rates (mm/yr)			
		Geologic	Pollitz	Shen-Bird	Zeng
Hosgri (all FGMs)	1.7 (0.6-3.0)	2.5 ± 1.0	3.8 ± 1.3	1.0 ± 0.5	2.8 ± 0.7
Shoreline (all FGMs)	0.07 (0.03-0.16)	0.1* ± 0.125	0.01 ± 0.08	0.05 ± 0.10	0.11 ± 0.90
Los Osos OV	0.26 (0.17-0.39)	0.39* ± 0.2	0.25 ± 0.07	0.24 ± 0.08	0.21 ± 0.91
Los Osos SW	0.19 (0.13-0.27)				
Los Osos NE	0.42 (0.31-0.55)				
San Luis Bay OV	0.16 (0.10-0.24)	0.2*† ± 0.125	0.20† ± 0.10	0.12† ± 0.09	0.13† ± 0.7
San Luis Bay SW	0.22 (0.13-0.32)				
San Luis Bay NE	0.16 (0.10-0.24)				

* A category slip rate; not based on site-specific data
† Slip rate listed for the 45° San Luis Range (extended) source, which has a higher slip rate than the vertical San Luis Bay source in the ERF-2023 model.

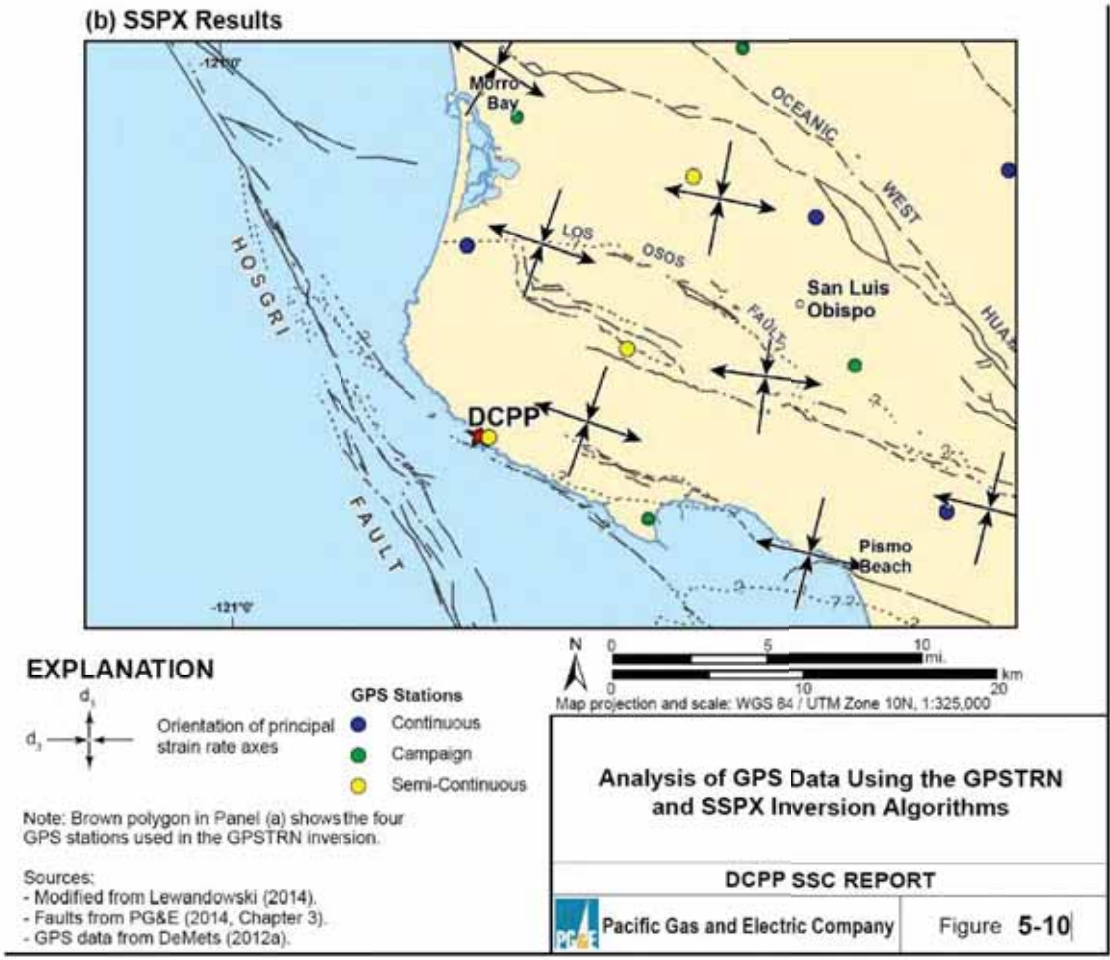
Table 5-11 from SSC24

SSC15 Geodetic Analysis

- Bird Assertion: PG&E assumes that GPS geodetic velocities are not useful for site-specific



SSC15 Analysis of 1D profiles through GPS
(SSC15, Figure 5-13, data from DeMets et al., 2014)

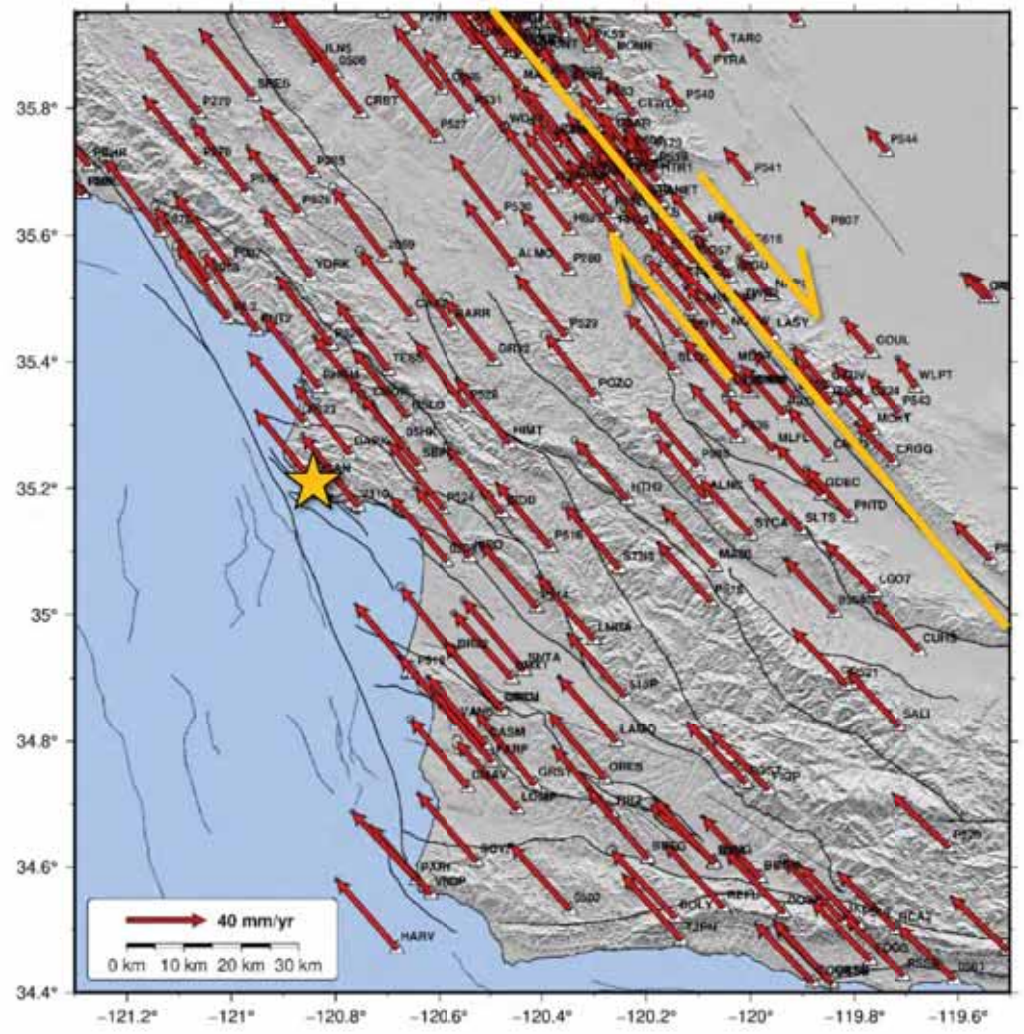


SSC15 Analysis of principal strain orientations from GPS
(SSC15, Figure 5-10, data from DeMets et al., 2012)

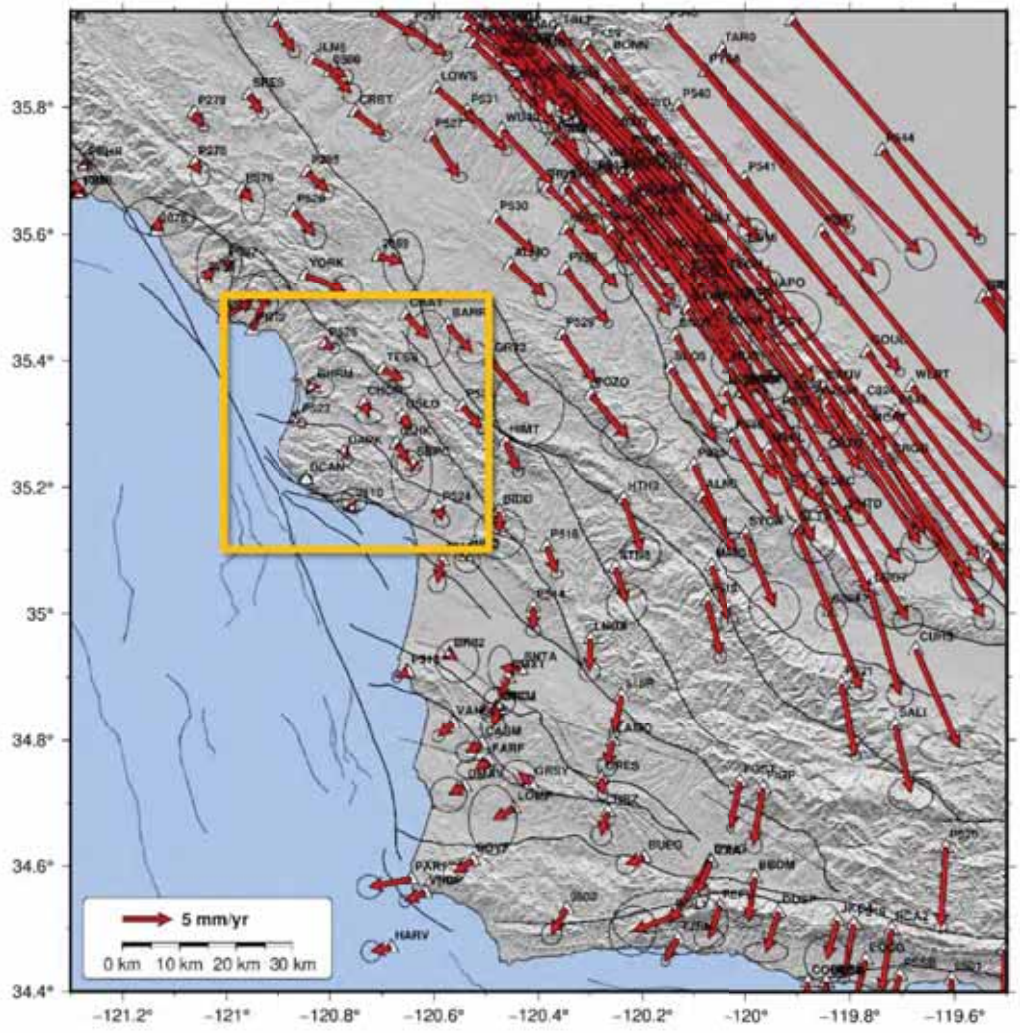
Geodetic Analysis

- **Bird Assertion:** PG&E operated a GPS receiver at DCPP, and SSC15 reported the shortening direction across the Irish Hills as ~N15ºE but did not report the shortening rate.
- **SRT Finding:** We agree that the shortening rates should have been included. Our analysis addresses this.
- **Bird Assertion:** The SSC24 update added no new geodetic information, even though an additional 9 years of data should have greatly reduced all uncertainties!
- **SRT Finding:** The east and north standard deviations of the DCAN velocity vector are 1.97 and 1.88 mm/yr, respectively, for the Murray-Moraleda et al. (2011) dataset and 0.25 and 0.23 mm/yr, respectively, for the Zeng (2022) dataset—an eightfold reduction of uncertainty. This motivated a new analysis.

Zeng (2022) GPS Velocities



Zeng (2022) GPS velocities relative to the North American plate. Faults from the SCEC Community Fault Model v7.0

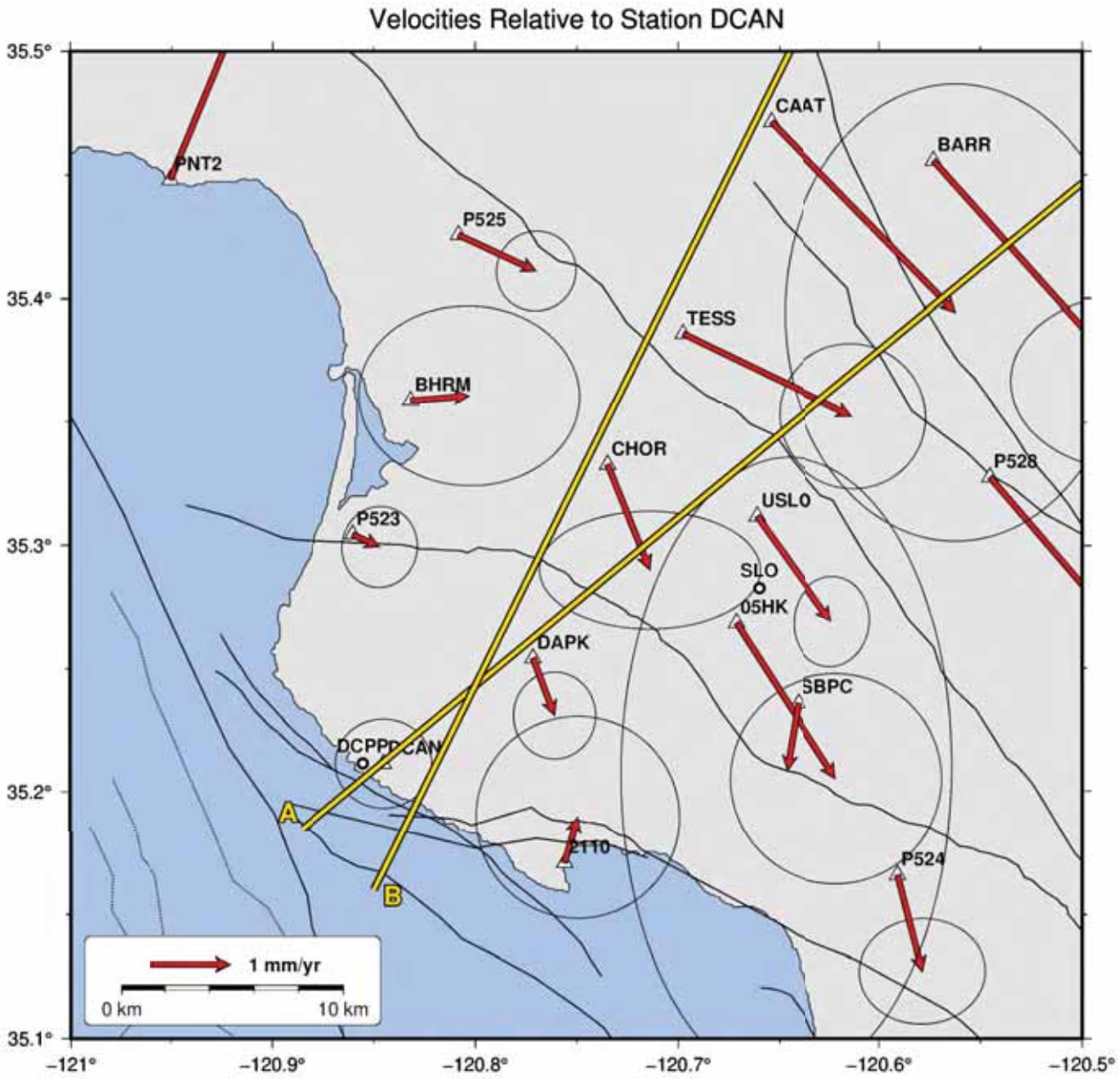


Zeng (2022) GPS velocities relative to station DCAN

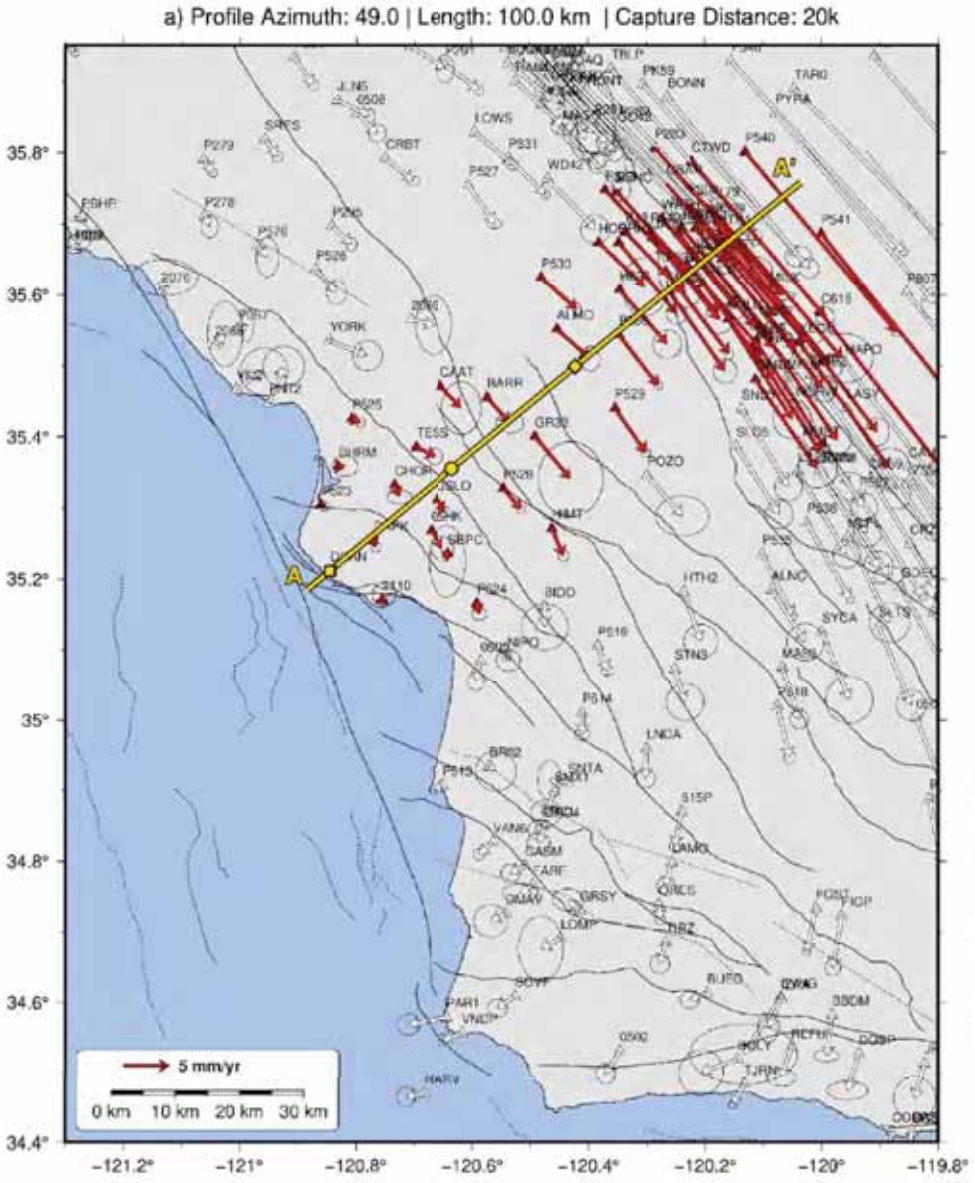
GPS Station Velocities

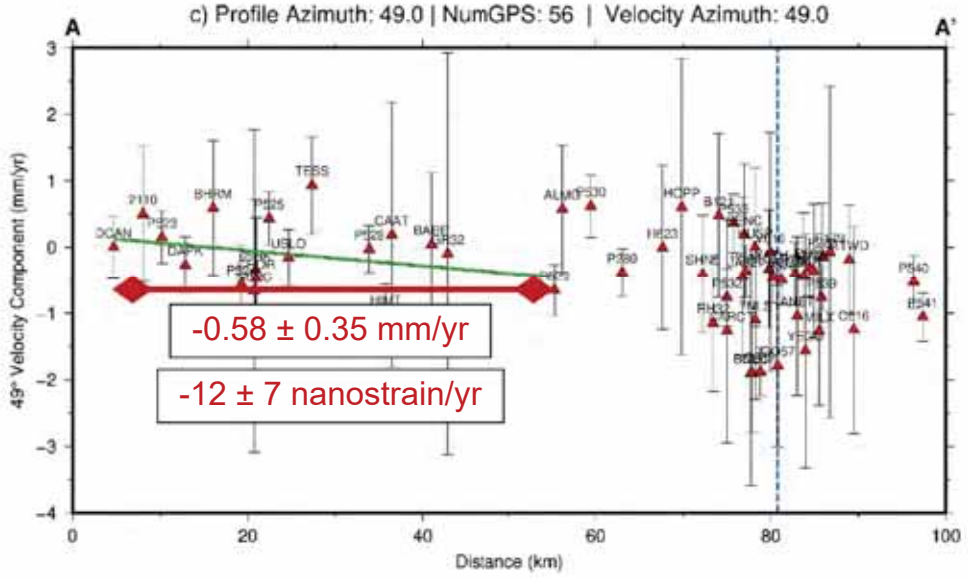
Bird Assertions:

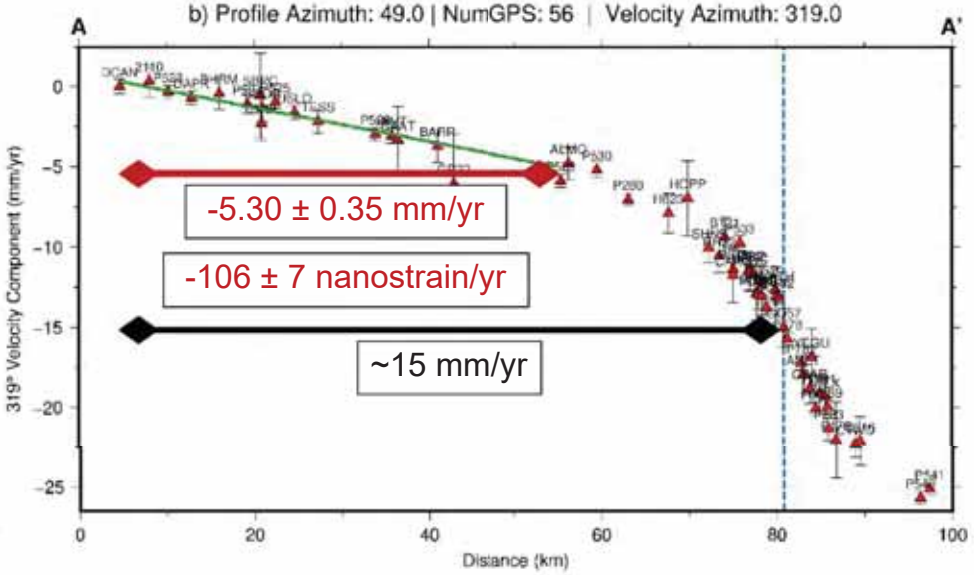
- DCAN is converging at 0.4 mm/yr with respect to DAPK and converging at 1.1 mm/yr with respect to CHOR.
- Site 2110 is converging at 1.7 mm/yr with respect to DAPK (half-way across the Irish Hills) and converging at 2.4 mm/yr with respect to CHOR.
- Bird Summary: The average of the DCAN-CHOR and 2110-CHOR interseismic shortening rate is 1.8 mm/yr.
- **SRT Findings:** 1) We cannot reproduce these velocities. 2) Velocities and station locations should be projected in a consistent direction to evaluate deformation.



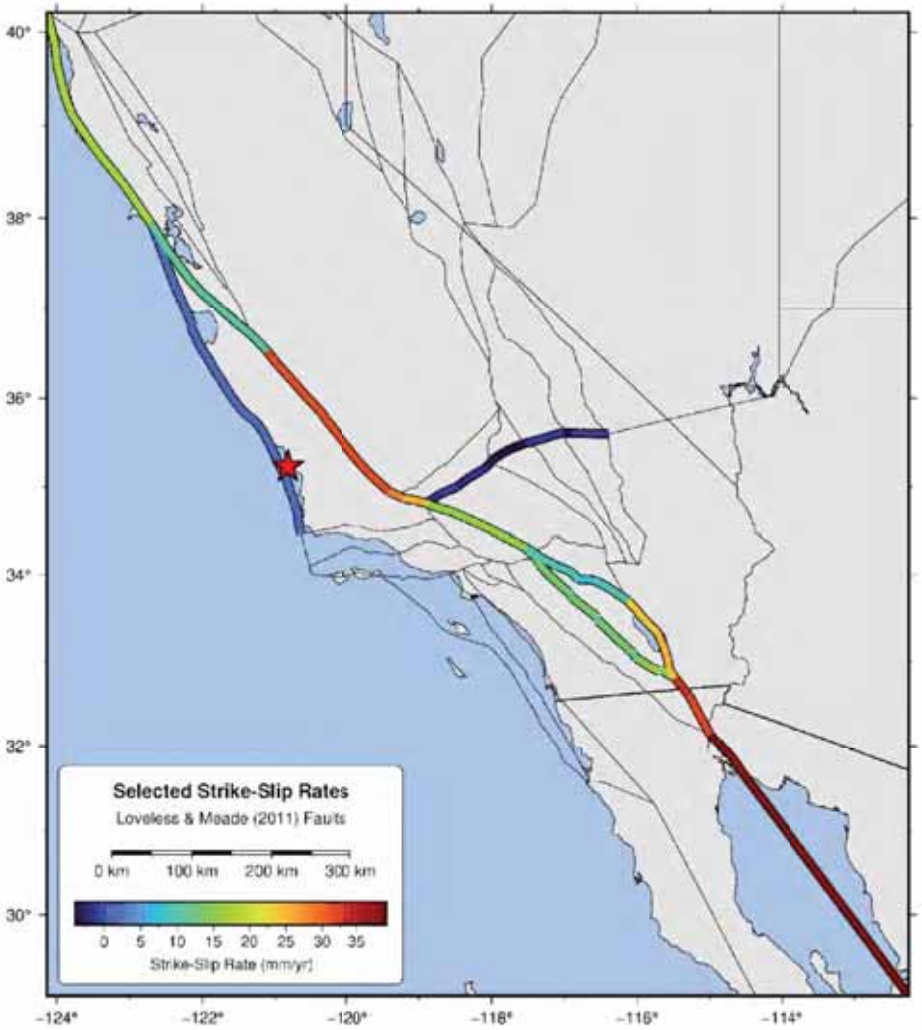
San Andreas fault-Normal Profile



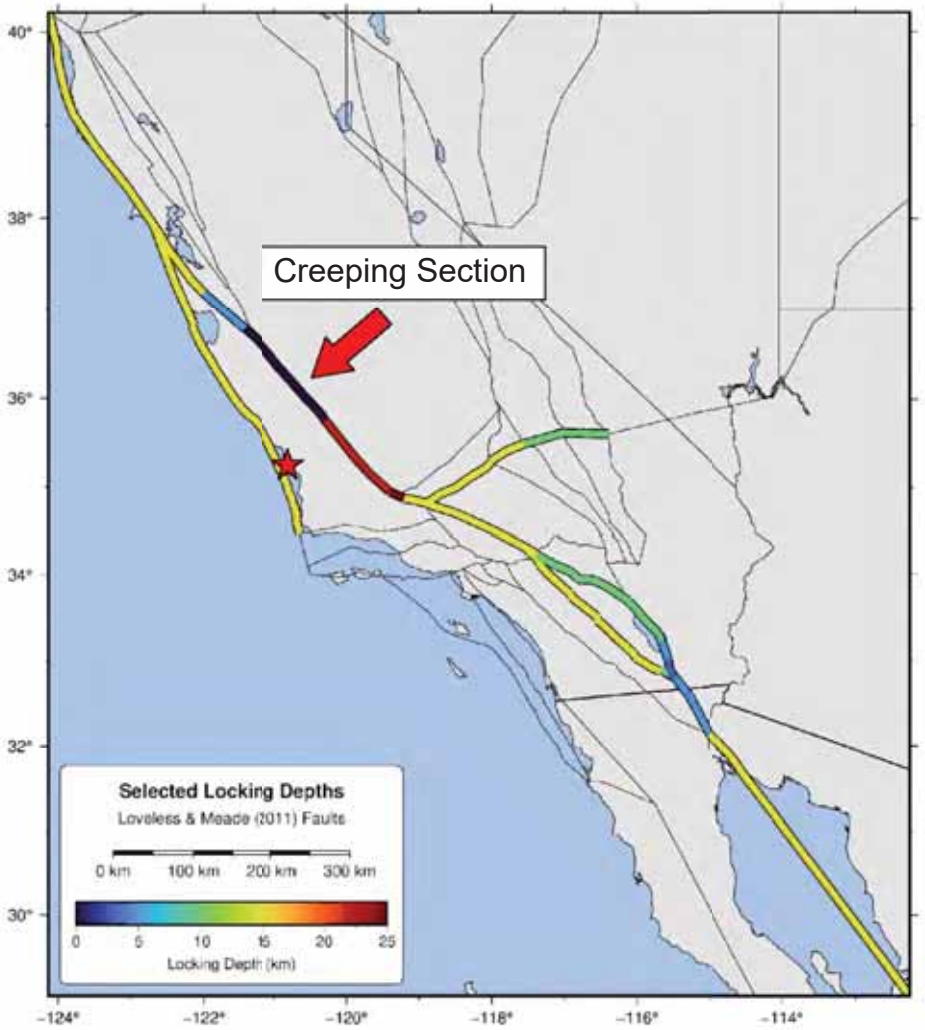




Removing San Andreas and other Deformation

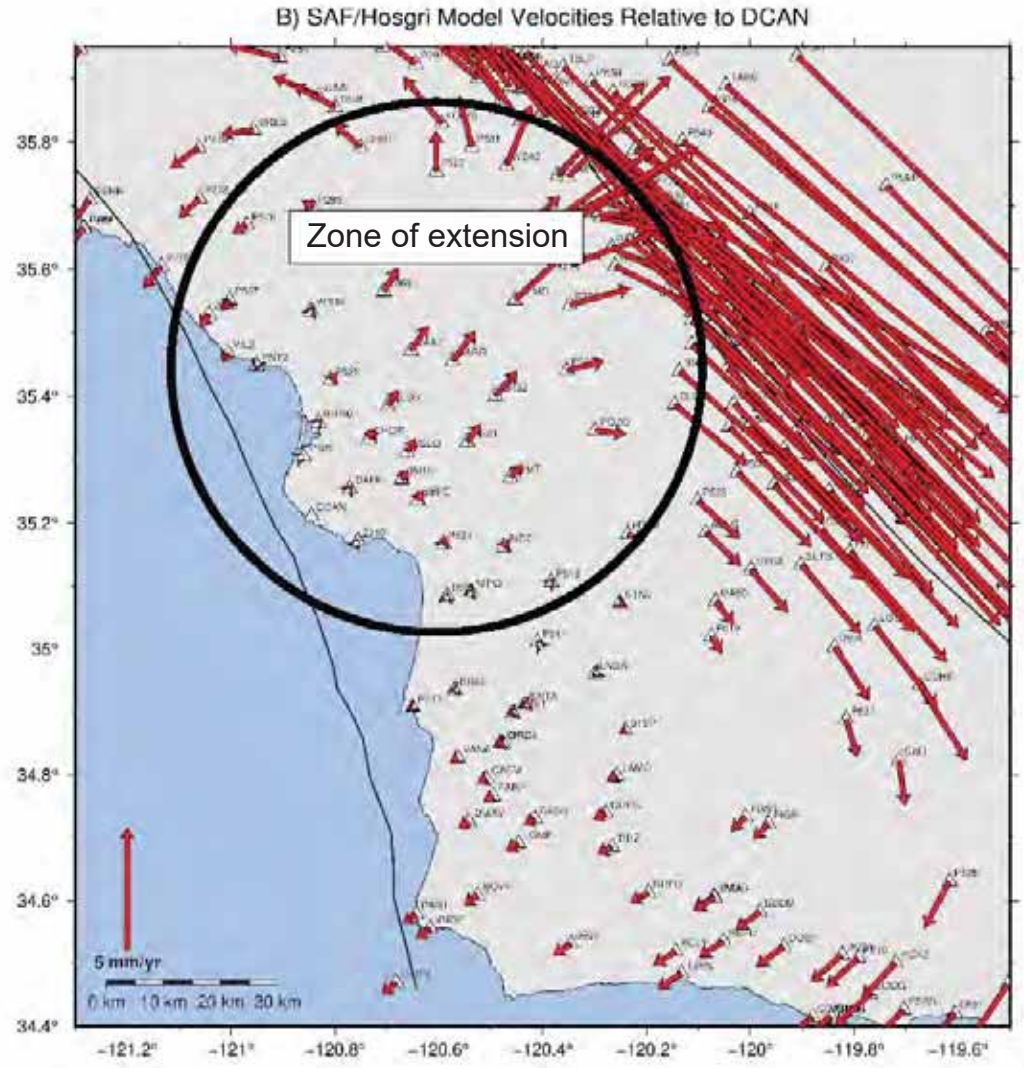


Fault geometry and slip rates from Loveless & Meade (2011). All faults are vertical. The Hosgri-San Gregorio fault is assigned the SSC24 average slip rate of 1.7 mm/yr

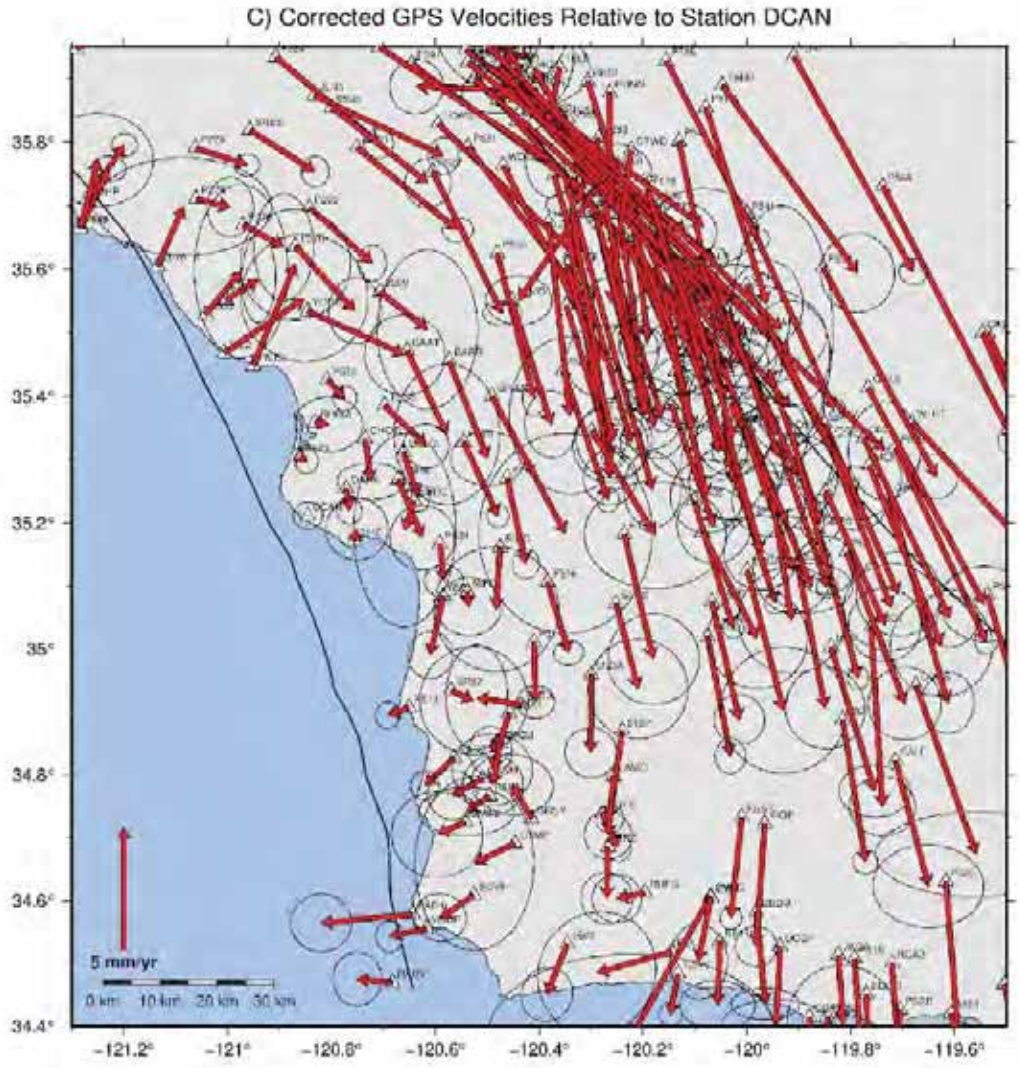


Locking depths from Loveless & Meade (2011). Note the SAF creeping section has a locking depth of zero.

"Corrected" GPS Velocities

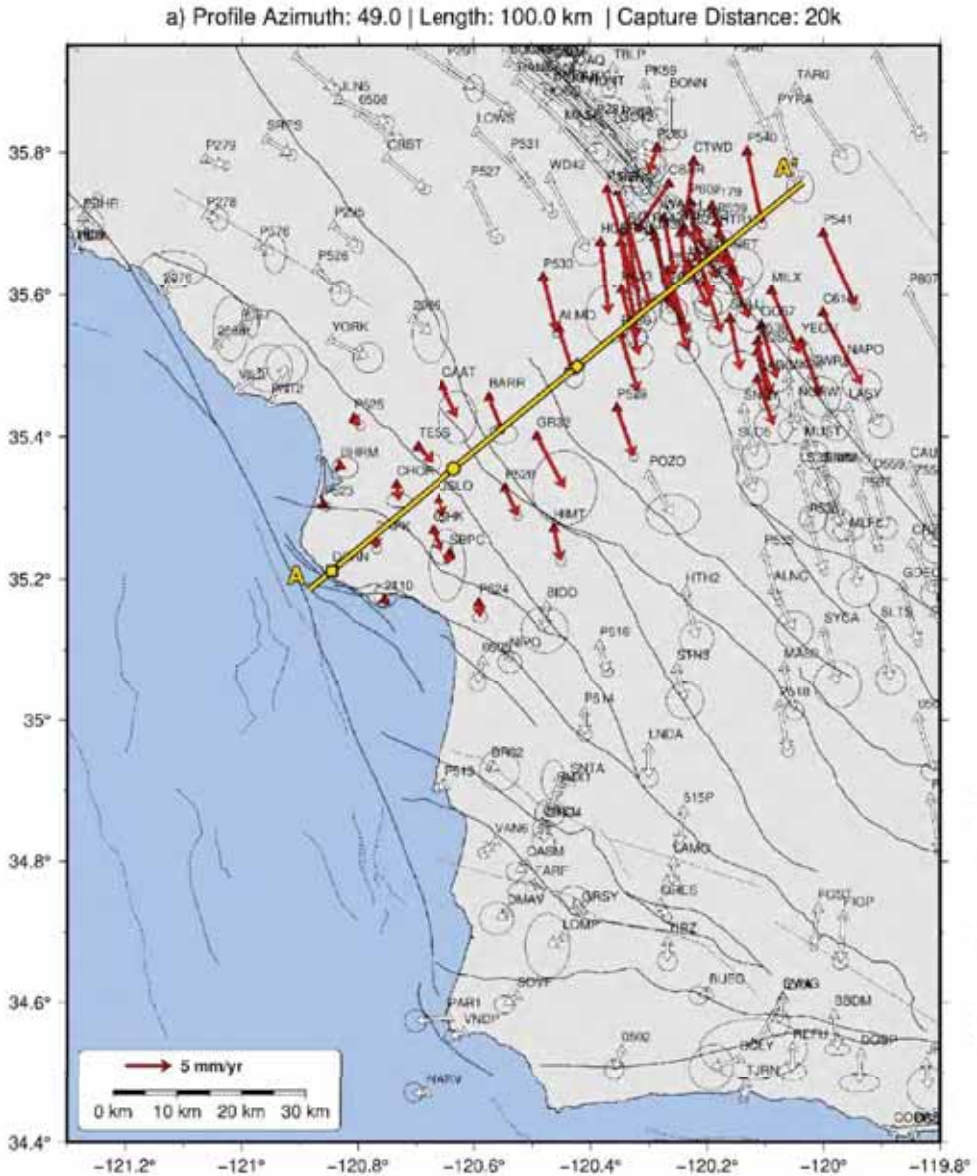


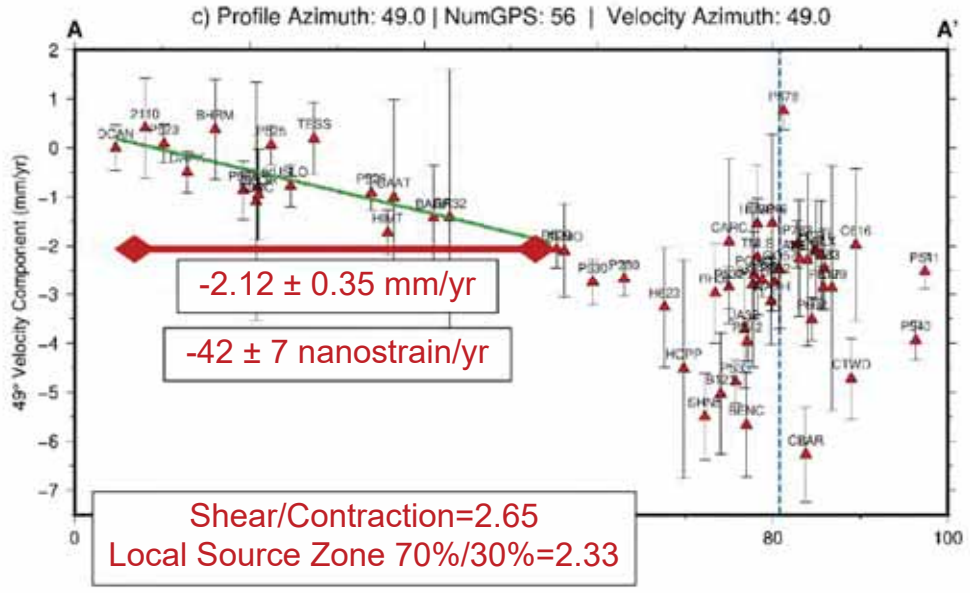
Interseismic velocities from the regional model of the San Andreas, Hosgri, and other faults. Note the regional extension.

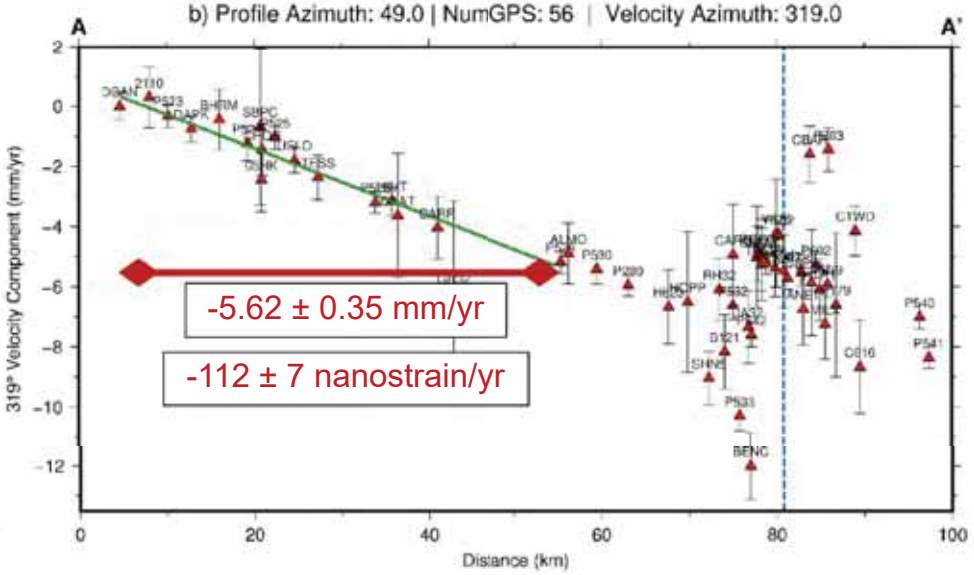


The "corrected" GPS is calculated by subtracting the SAF-Hosgri model from the Zeng (2022) GPS velocities.

Corrected GPS: SAF-Normal Profile







Strain Rate Inversion Methods

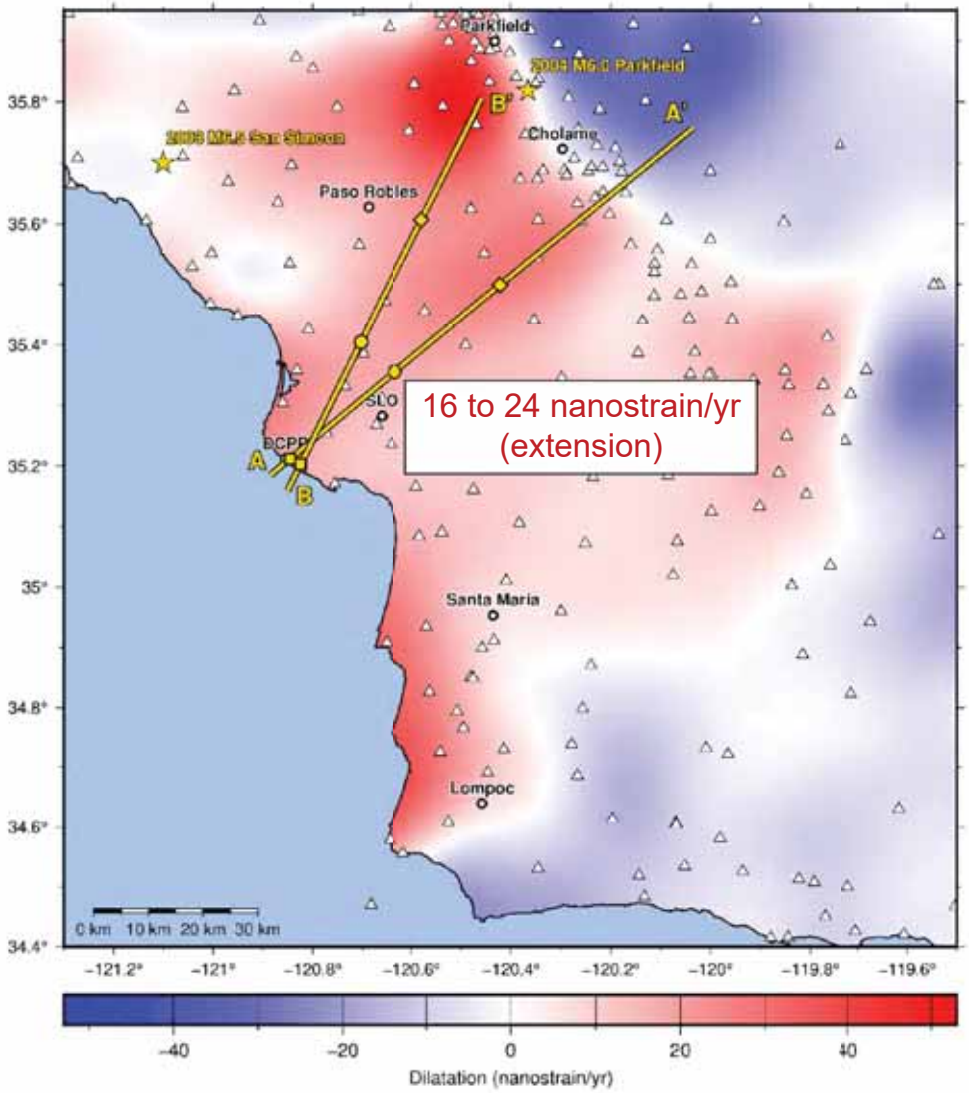
- Strain rates can be calculated from GPS velocities using inverse methods
  - We follow established methods (Allmendinger et al., 2007; 2009; Marshall et al., 2013)
- Because GPS velocities often contain inelastic motions, we follow Sandwell & Wessel (2016) and interpolate the GPS data before inversion
  - Interpolates using 2D elastic constraints
  - Smooths velocities; removes inelastic motions
- To visualize results, we decompose the strain rate tensor, $\dot{e}_{ij}$, into two invariants
  - I_1 = **Dilatation**: Areal contraction/extension

$$I_1 = \dot{e}_{11} + \dot{e}_{22}$$

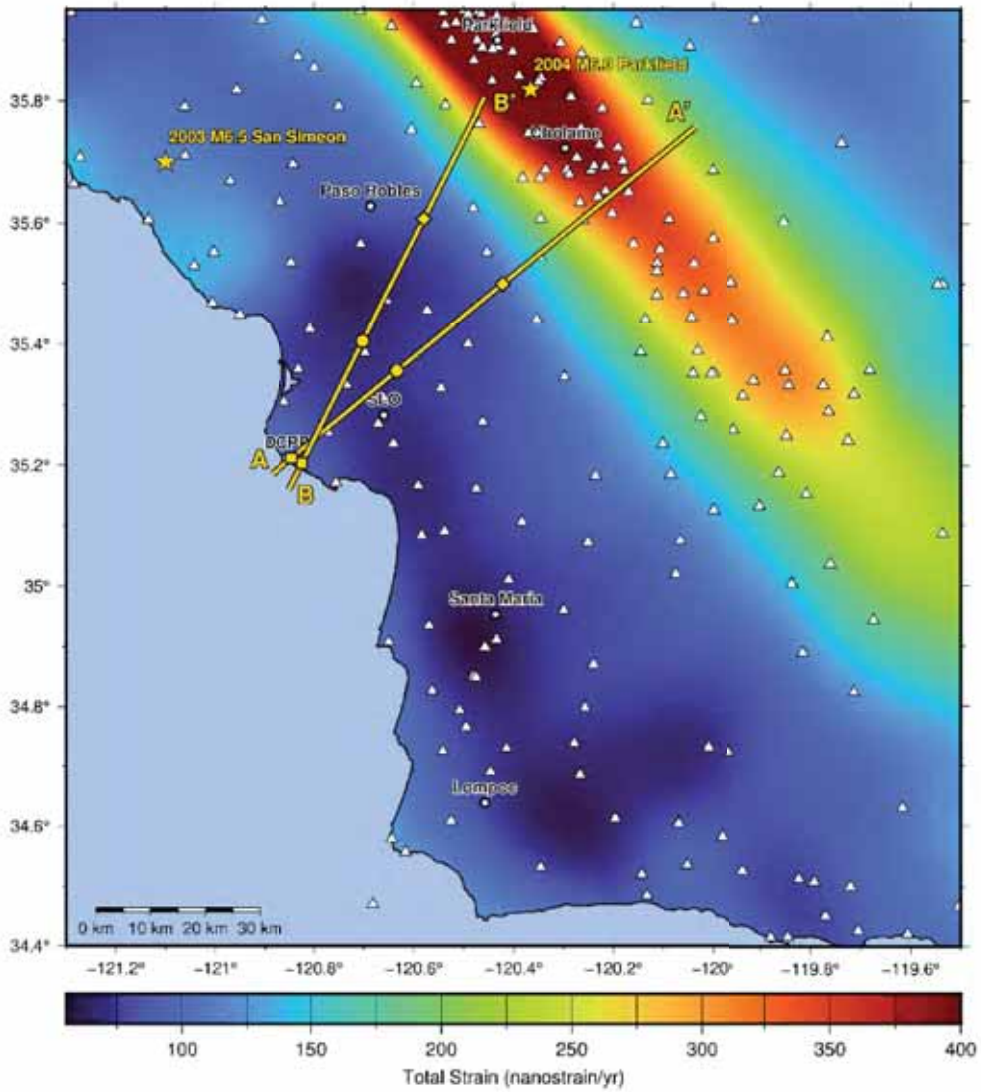
  - $\|\dot{e_{ij}}\|$ = **Total strain**

$$\|\dot{e_{ij}}\| = \sqrt{\dot{e}_{11}^2 + \dot{e}_{22}^2 + 2e_{12}^2}$$

Raw GPS Strain Rate Inversion

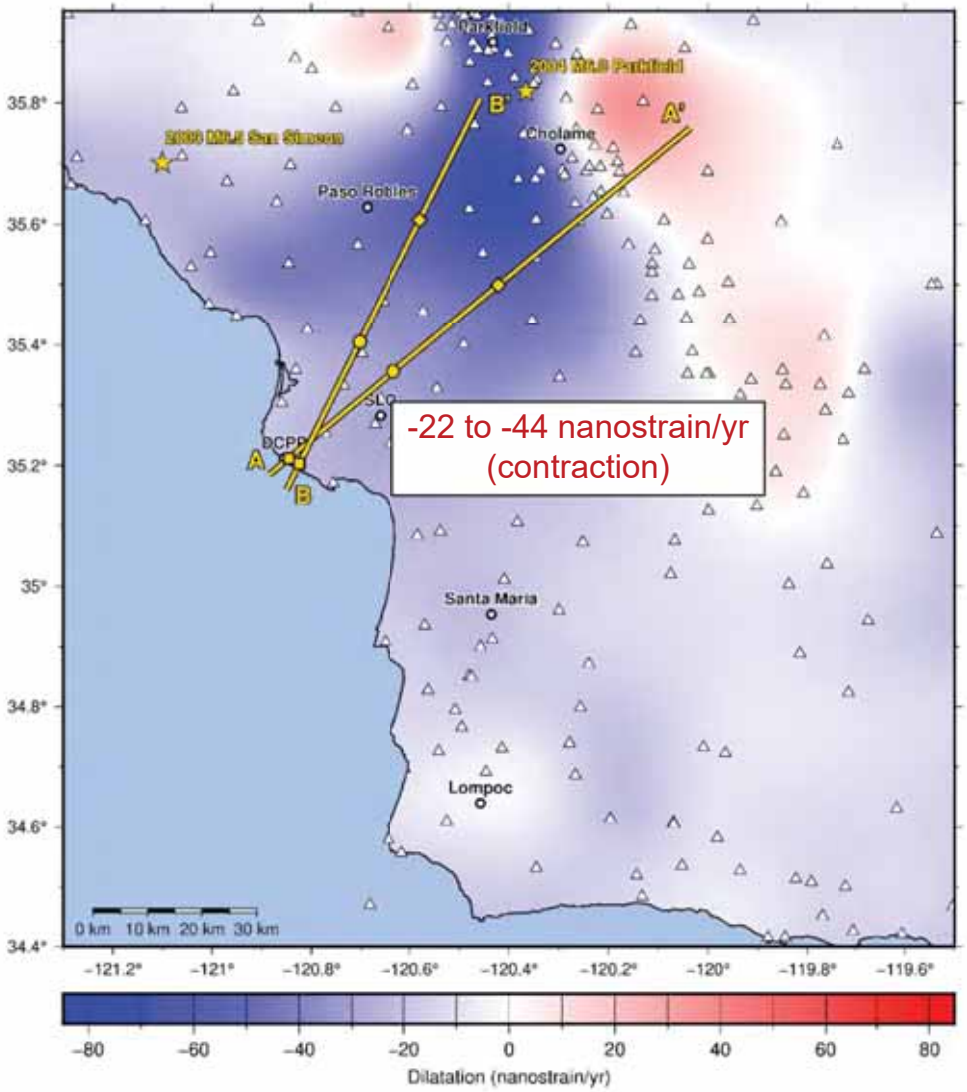


Extensional dilatation is found throughout the greater Irish Hills region.

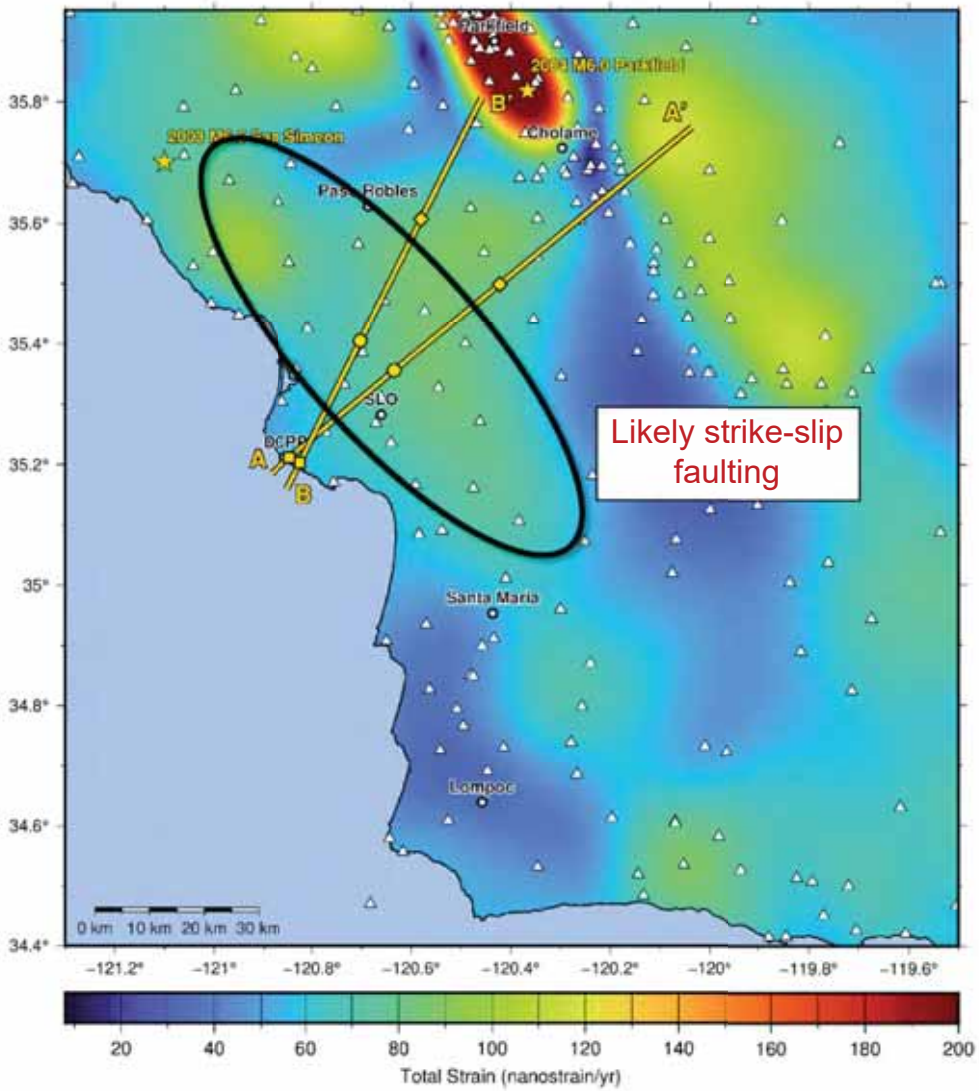


Total strain is focused along the SAF. Plot is truncated at 400 nanostrain/yr.

Corrected GPS Strain Rate Inversion



Data shows contractional dilatation throughout the greater Irish Hills region.



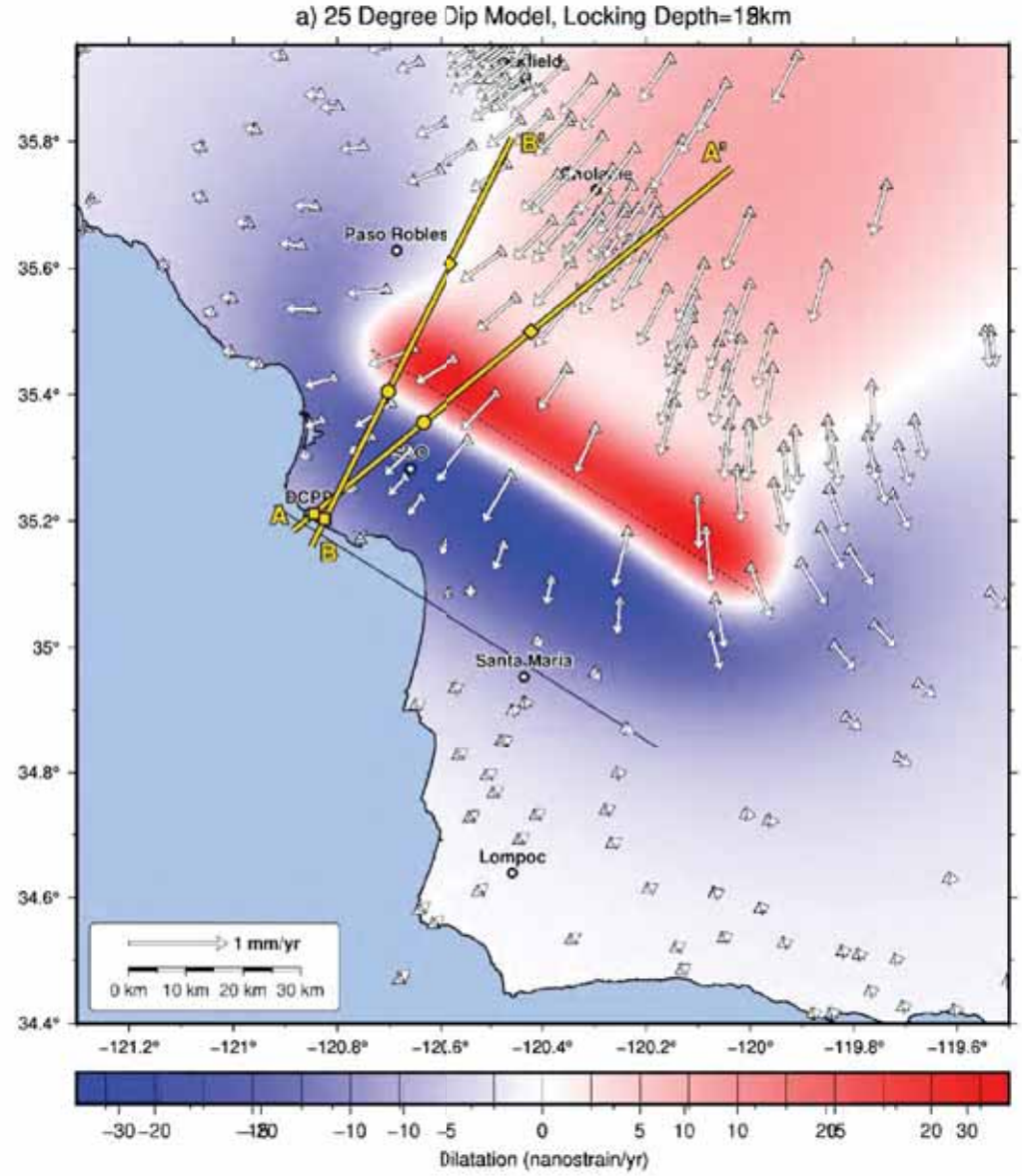
Total strain along the SAF is mostly removed. A few bands of strain appear to follow regional strike-slip faults.

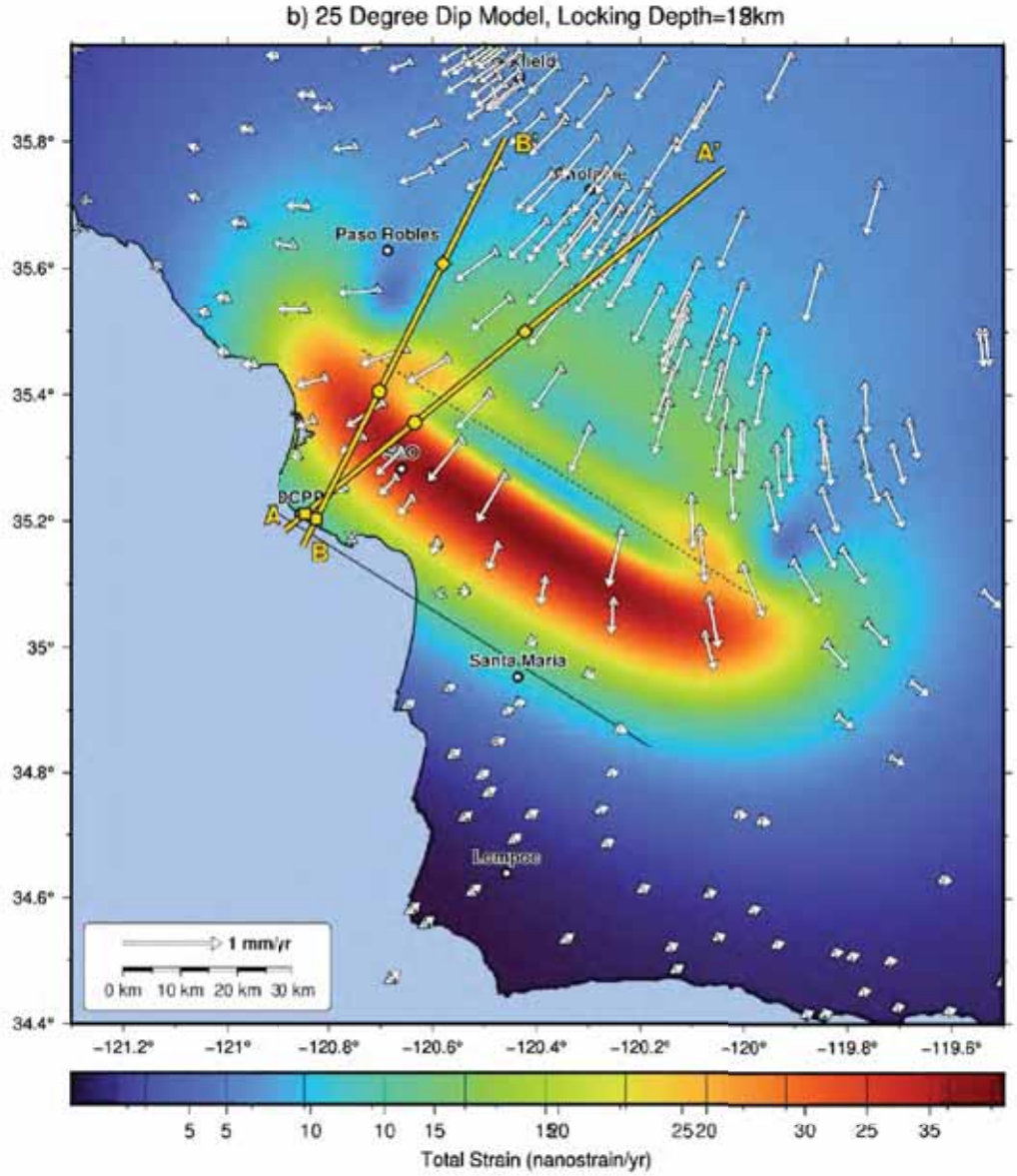
Elastic Dislocation Modeling Methods

- We next evaluate the predicted deformation due to several potential simplified SWBZ subsurface geometries, all with 2.5 mm/yr of slip
  - 25° dip (Bird assertion) 
  - 40° dip
  - Ramp-Flat-Ramp geometry

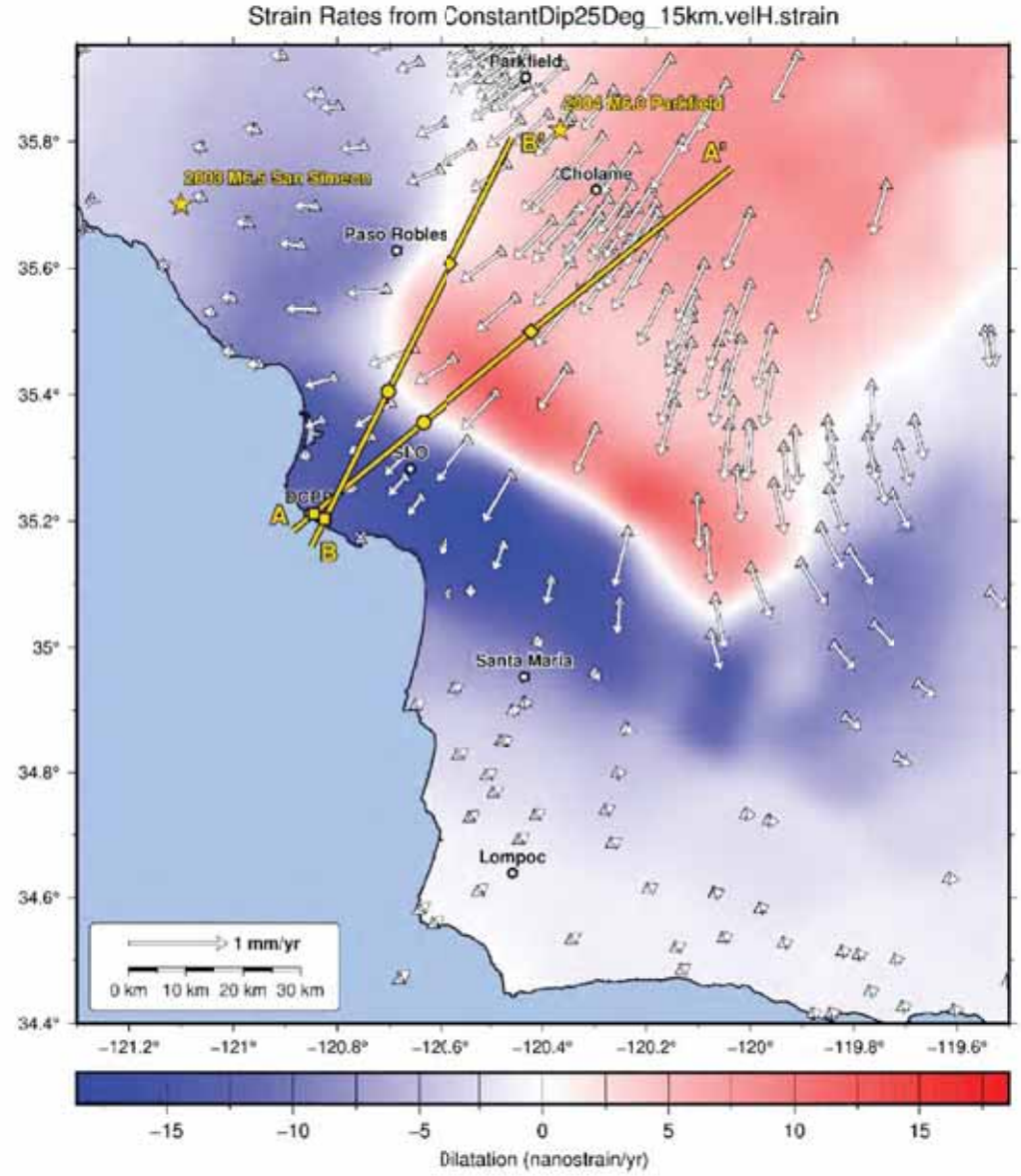
- We use poly3D (Thomas 1993) to predict the velocities and strain rates
  - Linear elastic rheology, triangular fault elements, Poisson's ratio of 0.25

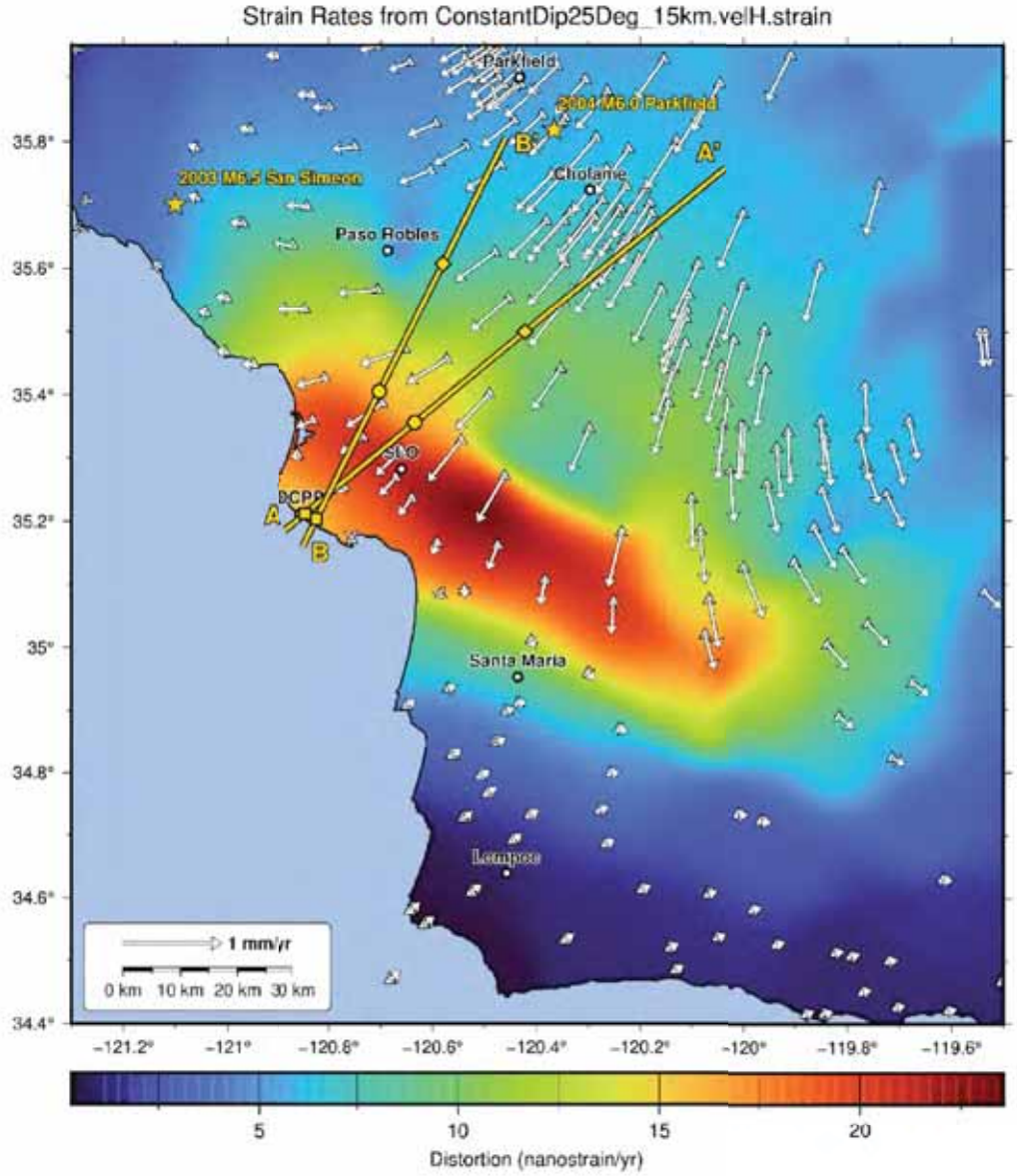
Elastic Dislocation Model Results: 25° Dipping Fault



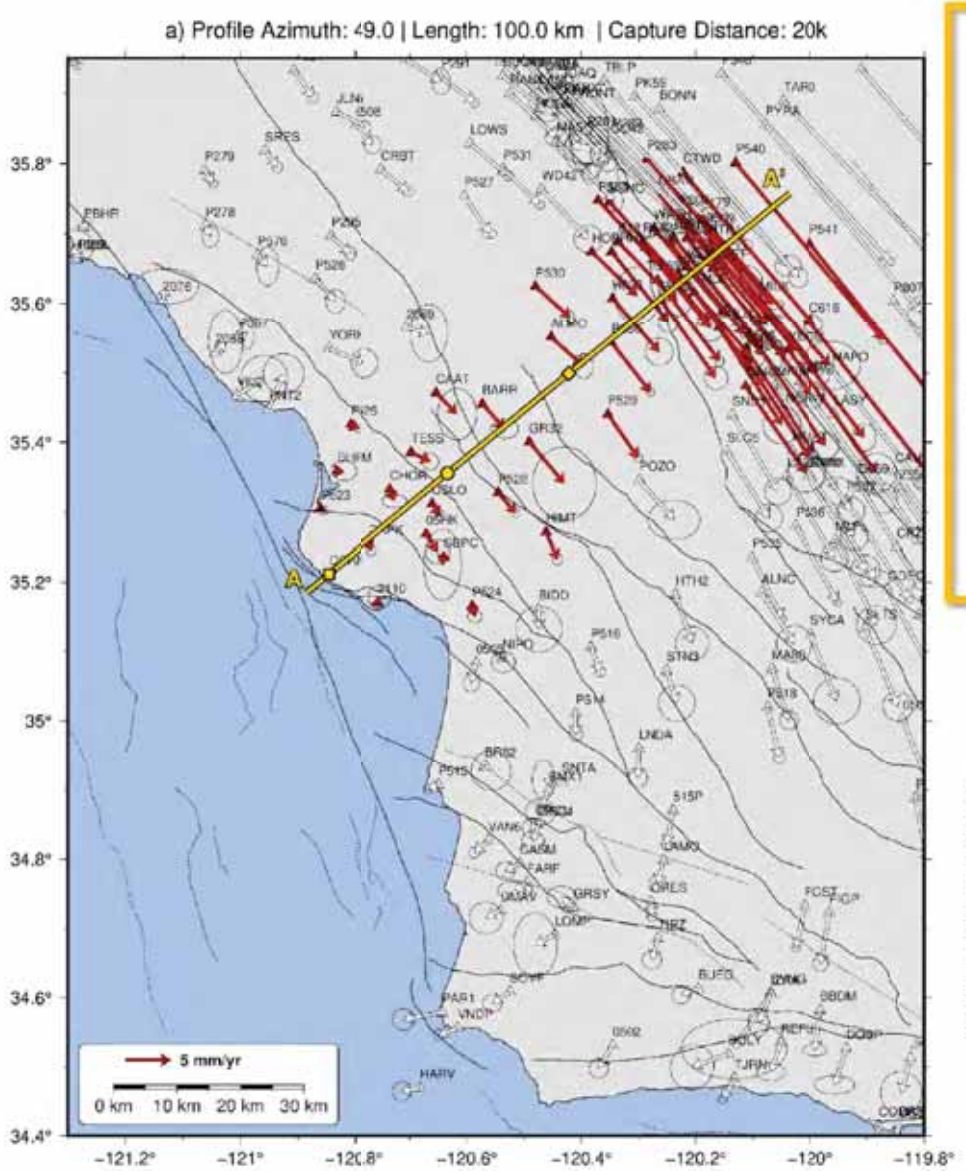


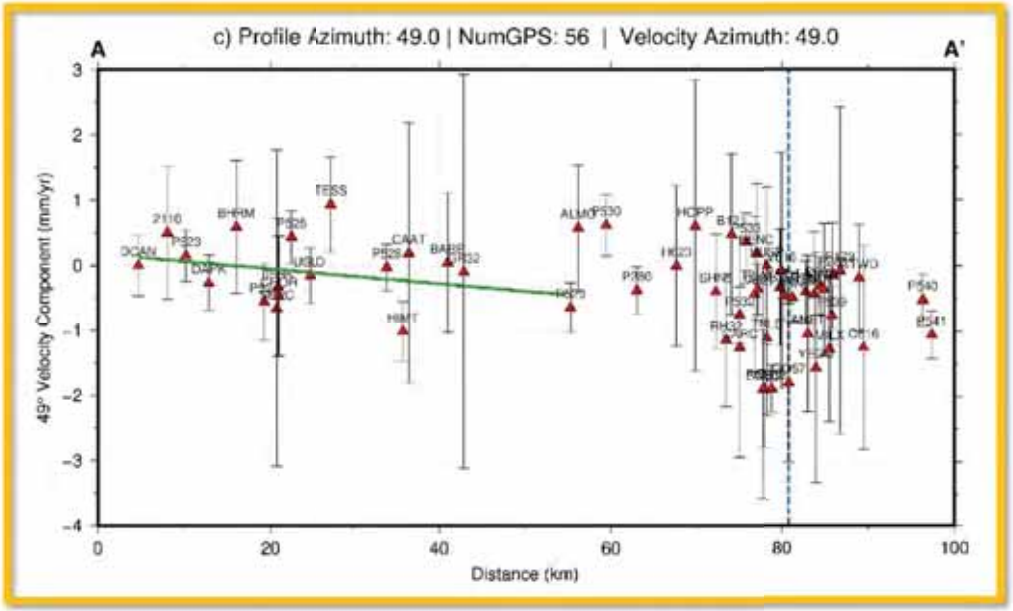
Does the GPS have Sufficient Spatial Resolution?

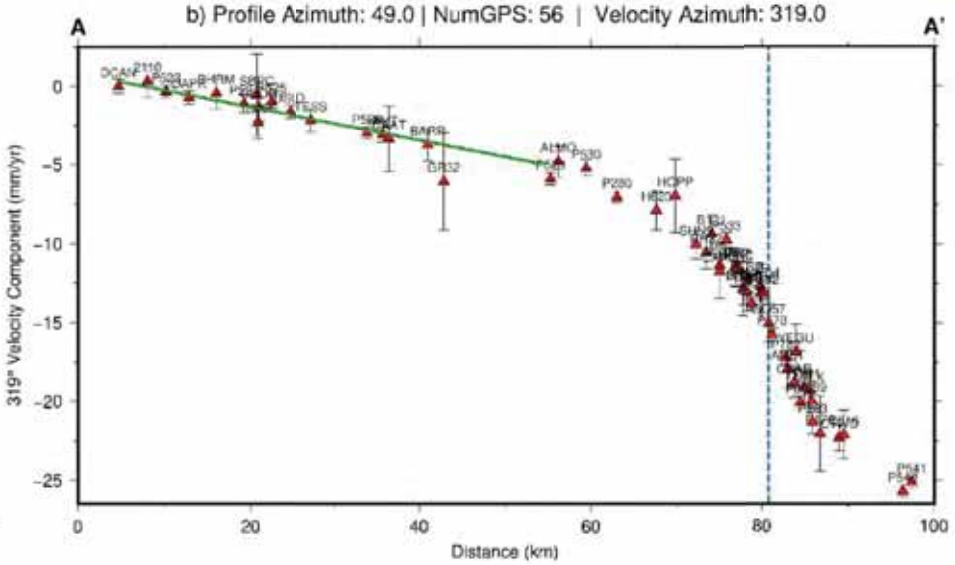




Can the GPS Data Uniquely Resolve the SWBZ Slip Rate?

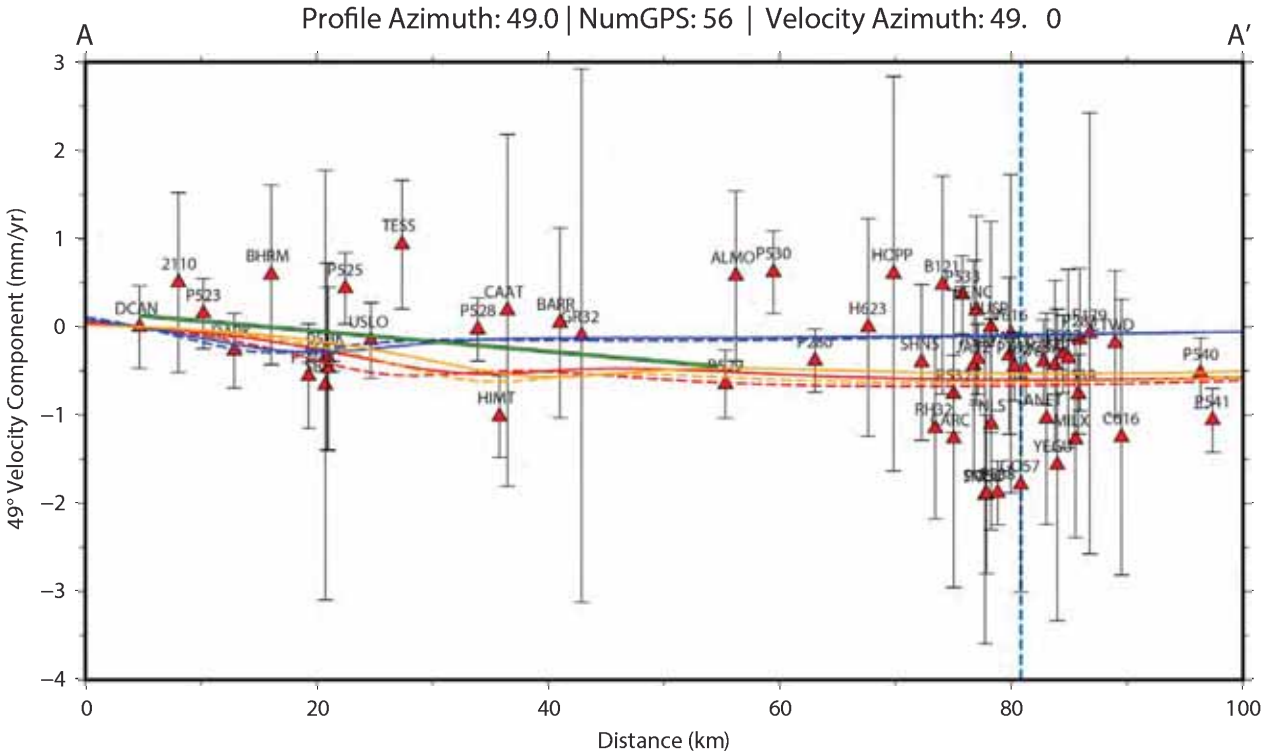






Can the GPS Data Uniquely Resolve the SWBZ Slip Rate?

- Surface velocities are small compared to the GPS uncertainties
- The GPS, alone, cannot uniquely resolve slip on the SWBZ
- A 3D kinematic and/or mechanical model of all faults is necessary to determine of the SSC slip rates agree with the GPS deformation rates

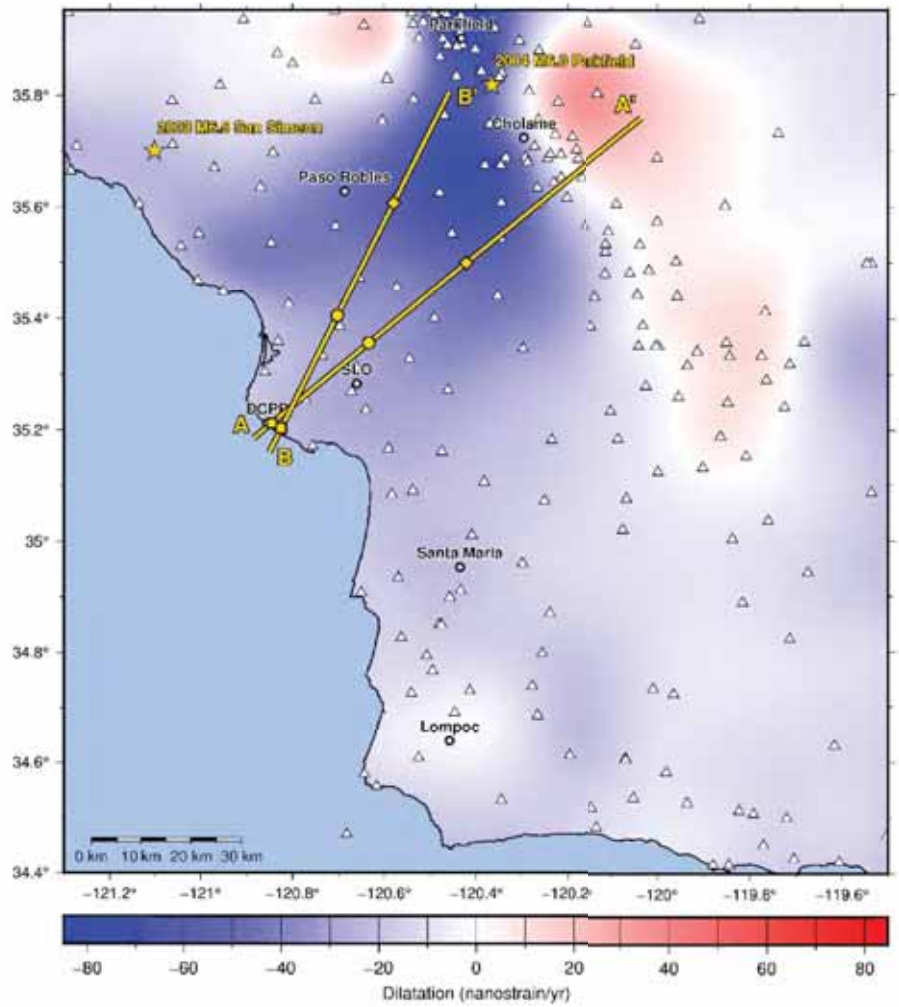


Red: 25˚ dip model
Blue: 40˚ dip model
Orange: ramp-flat-ramp model

Dashed / Solid line:
12 km / 15 km locking depth

Geodetic Findings

1. Geodetic results are dependent on removing the deformation associated with the San Andreas and other regional faults
2. Corrected GPS data show
   - Right-lateral deformation across the Irish Hills
   - Contractional component is ~20-40 nanostrain/yr
3. GPS cannot directly resolve the slip rates of individual faults without a comprehensive 3D model of all regional faults
   - Faults are densely spaced
   - Spatial distribution of stations is sufficient; need less velocity uncertainty



Dilatation rates from inversion of gridded corrected GPS data

Geodetic Recommendations

1. PG&E should follow up the SRT's preliminary work with a more complete study of the available GPS data.
2. The fault slip models that underlie the DCPP SSC should be developed into kinematic and mechanical models that can predict the interseismic deformation and can thus be directly tested against the GPS data.
3. Geologic slip-rate information should be acquired from the Rinconada, Huasna and Los Osos faults to permit better modeling of the shear component evident in the GPS data.

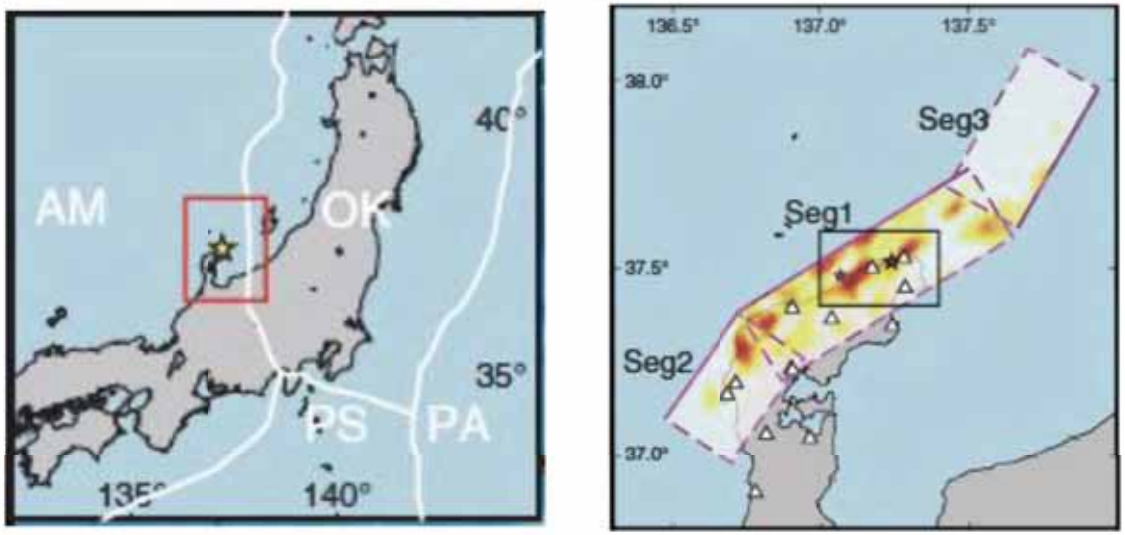
Analysis of the 2024 Noto Peninsula Earthquake

Tom Jordan

Analysis of the 2024 Noto Peninsula Earthquake

Bird's assertions:

- January 1, 2024, Noto Peninsula (Japan) earthquake (**M**7.5) is a good analog for a large thrust event beneath the Irish Hills
- Recurrence interval of a Noto24-type earthquake involving Irish Hills thrust faulting is 715-1000 yr, posing an unacceptable risk to the DCPP



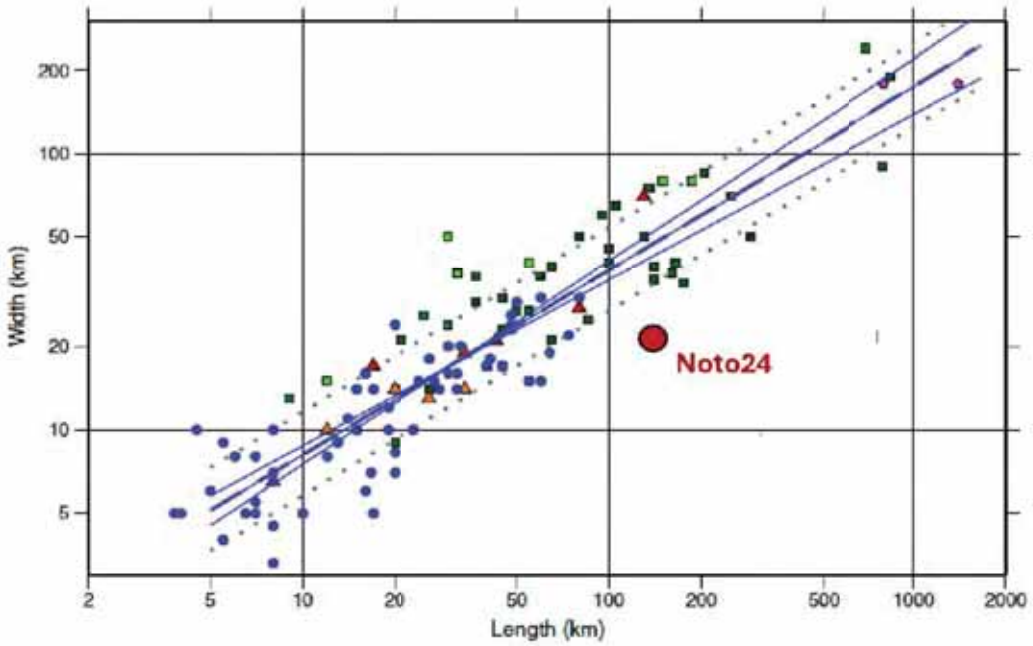
Xu et al. (2024, fig. 4)

The Noto24 earthquake was caused by reverse faulting that nucleated near the northern end of the Noto Peninsula and ruptured bilaterally for 150 km across multiple fault segments

Analysis of the 2024 Noto Peninsula Earthquake

Characteristics of the Noto24 earthquake:

- High stress drop with an average slip of 4 m (twice Bird's value)
- High shaking intensities (due to high stress drop)
- Long rupture with high length-to-width aspect ratio (~7)



Leonard (2010, fig. 1)

Analysis of the 2024 Noto Peninsula Earthquake

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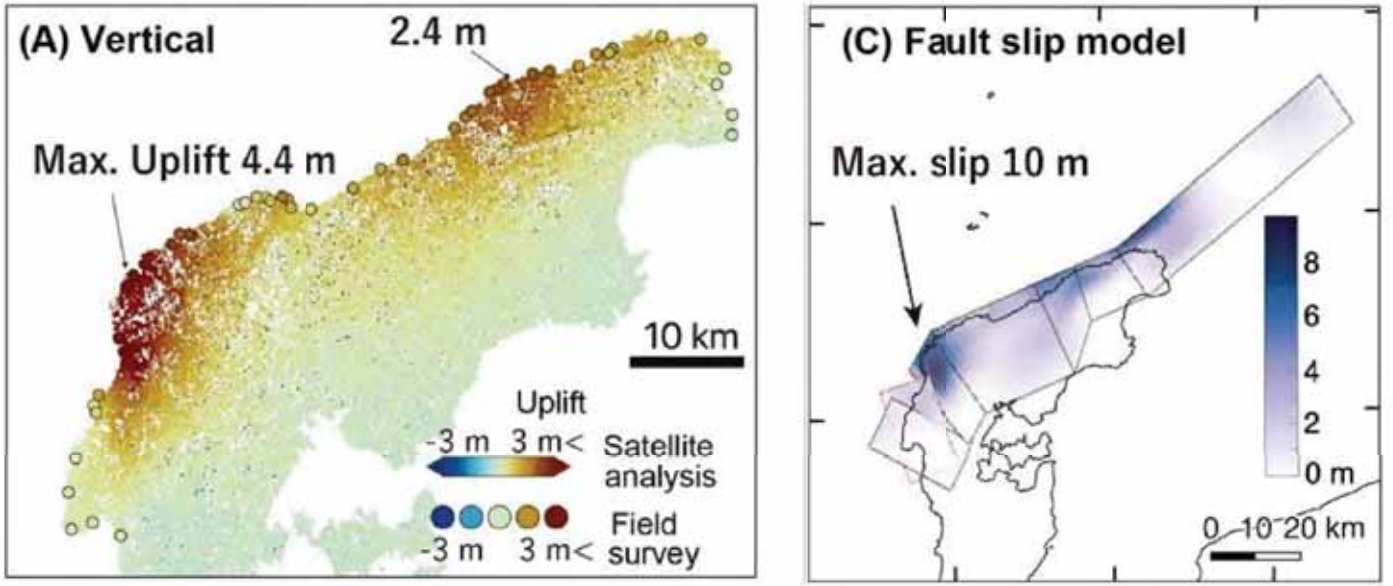
- Long rupture with high length-to-width aspect ratio (~7)
- Good correlation between uplift and slip – uplift is proxy for slip



Fukushima et al. (2024, fig. 2)

Analysis of the 2024 Noto Peninsula Earthquake

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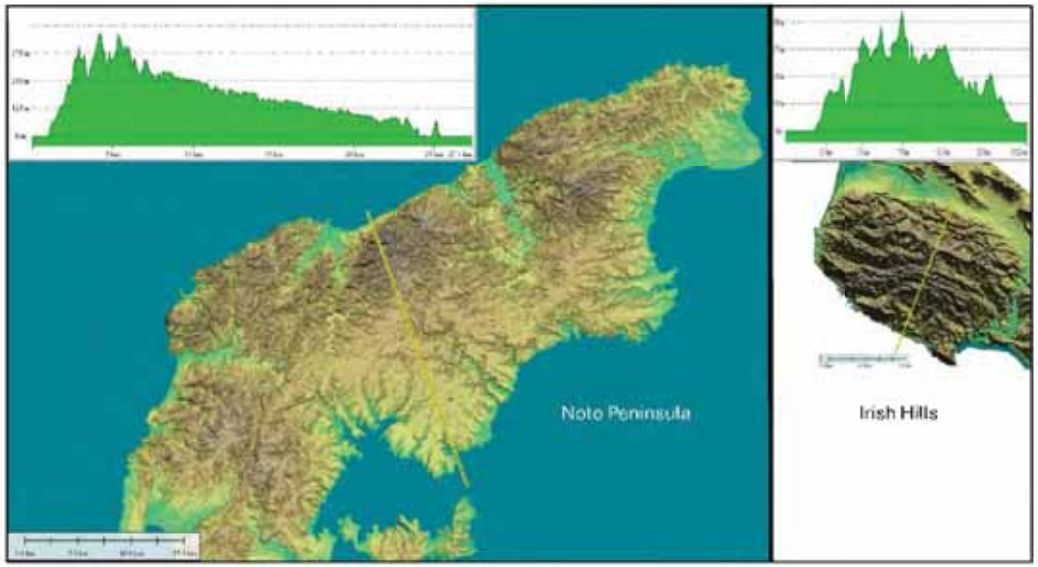
- High shaking intensities (due to high stress drop)
- Long rupture with high length-to-width aspect ratio (~7)
- Good correlation between uplift and slip – uplift is proxy for slip
- Good correlation between uplift and 120 ka uplift rate – uplift rate is proxy for slip rate



LCI (2024, fig. 12)

Analysis of the 2024 Noto Peninsula Earthquake

- Estimation of Noto24 recurrence interval T_R from co-seismic uplift and uplift rate:

$$T_R = \left(1 + \frac{\lambda_{GR}}{\lambda_C}\right) \times \text{co-seismic uplift} \div \text{uplift rate}$$

1.0 (maximal)

2.0 (GR)

2 m (Noto24 eqk) ÷ [0.7-1.0] mm/yr (Noto Peninsula)

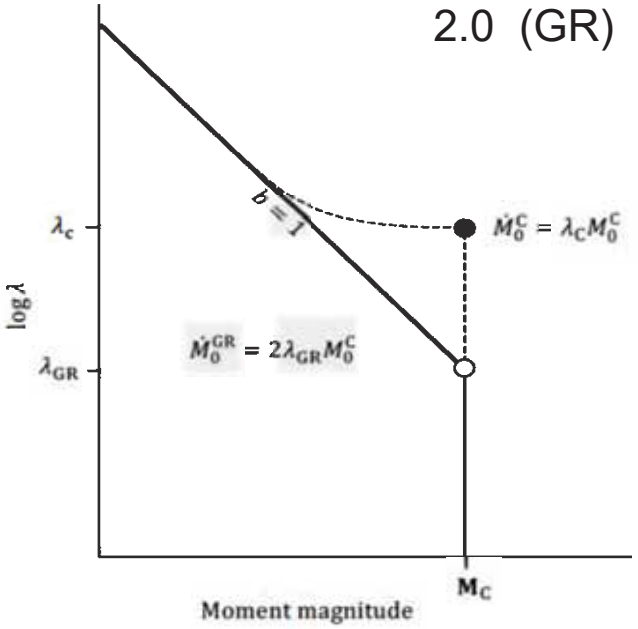


Table 3.5. Estimates of Noto24 recurrence intervals based on uplift data

Recurrence model	λ_{GR}/λ_C	Noto Peninsula (yr)	Irish Hills (yr)
Bird (2024)	0	–	715-1,000
Maximal earthquake	0	2,000-2,900	8,300-16,700**
Characteristic earthquake	0.5	3,000-4,290	12,500-25,000**
Gutenberg-Richter*	1	4,000-5,700	16,700-33,300**

*Preferred model **95% CI

Masuda et al. (2024): "Tectonic geomorphology investigations on uplifted marine terraces along the northern Noto Peninsula suggest that the 2024 earthquake was a rare event occurring once every several thousand years."

Analysis of the 2024 Noto Peninsula Earthquake

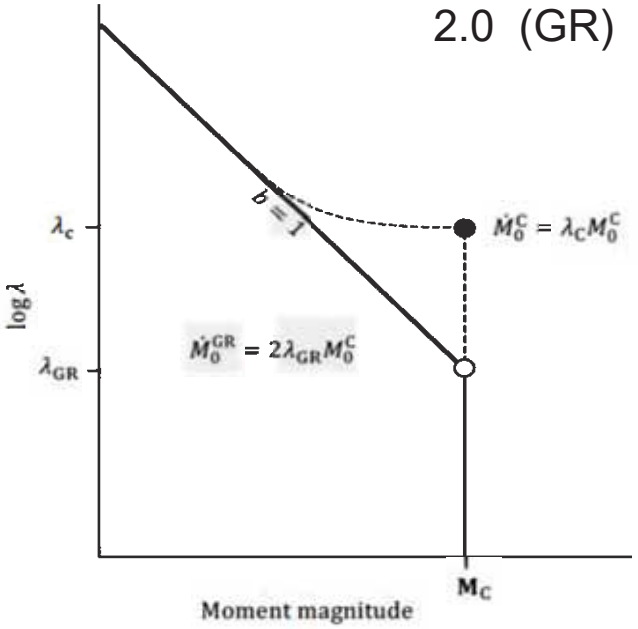
- Estimation of Noto24 recurrence interval T_R from co-seismic uplift and uplift rate:

$$T_R = \left(1 + \frac{\lambda_{GR}}{\lambda_C}\right) \times \text{co-seismic uplift} \div \text{uplift rate}$$

1.0 (maximal)

2.0 (GR)

2 m (Noto24 eqk) ÷. [0.12-0.24] mm/yr (Irish Hills)



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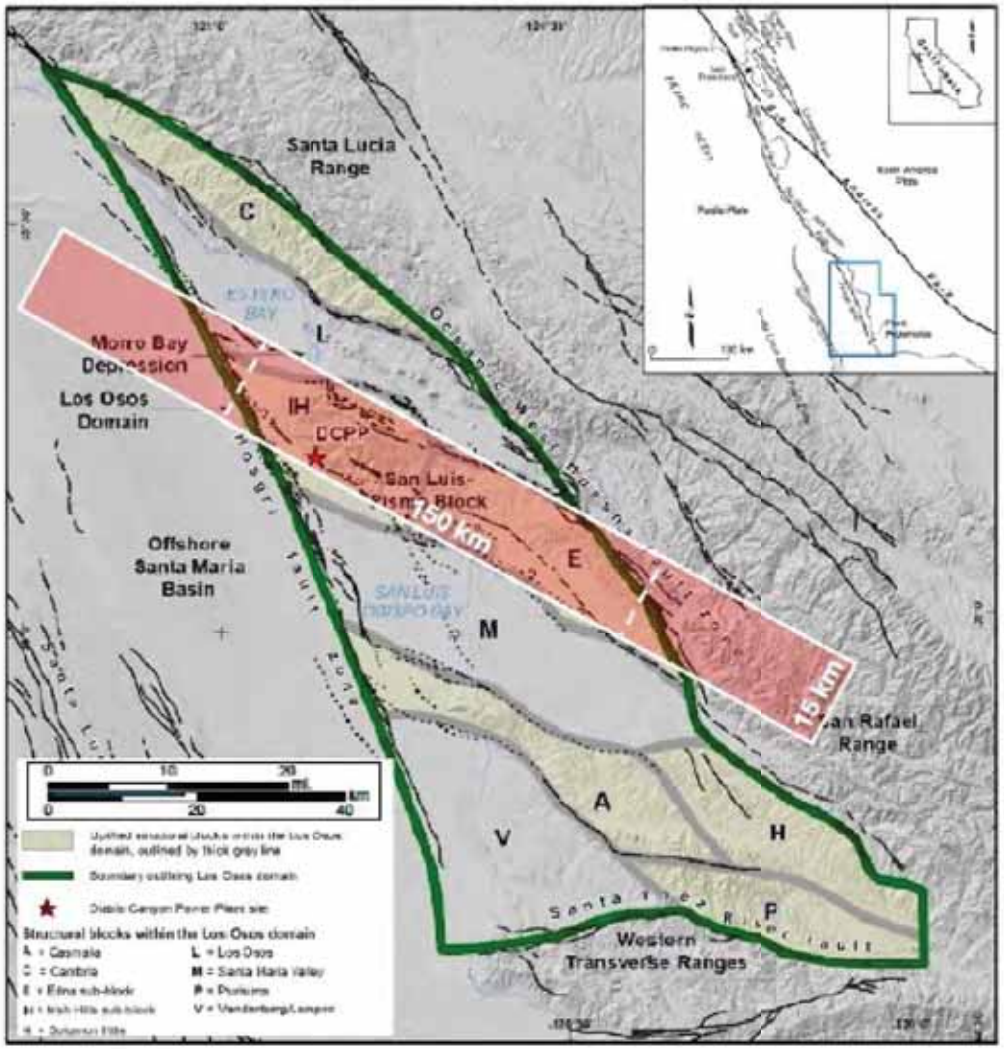
Analysis of the 2024 Noto Peninsula Earthquake

- Tectonic differences between the Noto Peninsula and the Irish Hills/San Luis-Pismo block (SLPB)

1. Uplift rate of Noto Peninsula is five times faster than uplift rate of Irish Hills
2. Historical rate of large earthquakes (**M** ≥ 6) is much greater in the Noto region than in the SLPB region
3. Tectonic deformation of the Noto Peninsula is compressional with little shear, whereas SLPB deformation is transpressional with a significant component of shear
4. Length of Noto Peninsula faulting is about twice the length of the SWBZ
5. Large, prominent fault scarps mapped offshore Noto Peninsula; no prominent scarps offshore Irish Hills
6. Rapid tilting of Noto Peninsula is on a larger scale than the block-like uplift of Irish Hills

   ⟹ indicates different fault configurations: single ramp or listric fault beneath Noto Peninsula vs. fault ramp bending to flat fault at intermediate seismogenic depths (7-8 km) beneath Irish Hills

Analysis of the 2024 Noto Peninsula Earthquake



SRT Finding: *Based on the anomalous characteristics of Noto24, including its*

- *extreme length,*
- *high stress drop, and*
- *large block tilting,*

a Noto24-type earthquake is not suitable as a characteristic earthquake for thrust faulting beneath the Irish Hills

Four Main Assertions of the Bird Critique

a. PG&E (2015, 2024) underestimated the hazard to DCPP from thrust faulting under the Irish Hills because it made four false assumptions. Removing these assumptions increases the thrust-faulting potency rate by a large factor.

b. Three independent analytic methods give values for the total slip rate on shallow-dipping thrust faults under the Irish Hills in the range of 2.0-2.8 mm/yr.

c. The January 1, 2024, Noto Peninsula (Japan) earthquake (**M**7.5) is a good analog for a large thrust event beneath the Irish Hills.

d. The recurrence interval of Noto24-type earthquakes involving Irish Hills thrust faulting is 715-1000 yr, which poses an unacceptable risk to DCPP.

Bird's Critique of PG&E Modeling Assumptions

a. PG&E (2015, 2024) underestimated the hazard to DCPP from thrust faulting under the Irish Hills because it made four false assumptions. Removing these assumptions increases the thrust-faulting potency rate by a large factor.

Table 4.1. Evaluation of Bird's False Assumptions

Assumption	Truth value	Assumed by PG&E?	Impactful?
1. The Irish Hills are uplifting as a rigid block, with no internal deformation	false	no	no
2. Active thrust faults may dip at any angle	false	no	no
3. Geologic structures older than ~0.33 Ma are irrelevant to seismic hazard estimation	false	no	no
4. GPS geodetic velocities are not useful for site-specific seismic hazard estimation	false	yes	no

* Bird deems this assumption to be false; evidence that it is true is given in §3.2

Bird's Critique of PG&E Modeling Assumptions

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Assumption	Truth value	Assumed by PG&E?	Impactful?
1. The Irish Hills are uplifting as a rigid block, with no internal deformation	false	no	no
2. Active thrust faults may dip at any angle	false	no	no
2a. Active reverse faults may dip more steeply than 45º	true*	yes	yes
3. Geologic structures older than ~0.33 Ma are irrelevant to seismic hazard estimation	false	no	no
4. GPS geodetic velocities are not useful for site-specific seismic hazard estimation	false	yes	no

* Bird deems this assumption to be false; evidence that it is true is given in §3.2

SRT finding: *Removing the four false assumptions in the development of a revised SSC would have little to no impact on the hazard estimates*.

Bird's Estimates of Slip Rates

- Method #1: SWBZ slip rate based on a 120-ka uplift rate of 0.18 ± 0.03 mm/yr and dip of 38° ± 3° is 0.29 ± 0.07 mm/yr
  - 10 times smaller than Bird's value of 2.8 mm/yr

Method	Bird (mm/yr)	SRT (mm/yr)
1. Isostatic	2.8	0.29 ± 0.07
2. Thrust fault heave rate	~2	0.50 ± 0.10
3. GPS geodetic horizontal shortening rate	2.2*	0.95 ± 0.32*

*Upper bound assuming all strain is elastic and released by slip only on SWBZ.

Bird assumptions: dip: 25°; uplift rate: 0.2 mm/yr.

SRT assumptions: dip: 38° ± 3°; uplift rate: 0.18 ± 0.03 mm/yr.

Bird's Estimates of Slip Rates

- Method #2: SRT's kinematically constrained fault-related fold model yields a thrust fault slip rate of 0.5 ± 0.1 mm/yr averaged since 5.1 ± 0.4 Ma
  - about 4 times less than Bird's estimate of 2 mm/yr.
  - marginally higher than 120-ka rate, suggesting some slowing of compressive deformation

Method	Bird (mm/yr)	SRT (mm/yr)
1. Isostatic	2.8	0.29 ± 0.07
2. Thrust fault heave rate	~2	0.50 ± 0.10
3. GPS geodetic horizontal shortening rate	2.2*	0.95 ± 0.32*

*Upper bound assuming all strain is elastic and released by slip only on SWBZ.

Bird assumptions: dip: 25°; uplift rate: 0.2 mm/yr.

SRT assumptions: dip: 38° ± 3°; uplift rate: 0.18 ± 0.03 mm/yr.

Bird's Estimates of Slip Rates

- Method #3: SAF-normal contractional strain rate from Zeng GPS velocities averaged over the Irish Hills is –20 to –40 nanostrain/yr
  - 2-5 times smaller than Bird's estimate of –80 to –100 nanostrain/yr
  - Thrust-fault slip rates assume all strain is elastic and released by slip only on SWBZ

Method	Bird (mm/yr)	SRT (mm/yr)
1. Isostatic	2.8	0.29 ± 0.07
2. Thrust fault heave rate	~2	0.50 ± 0.10
3. GPS geodetic horizontal shortening rate	2.2*	0.95 ± 0.32*

*Upper bound assuming all strain is elastic and released by slip only on SWBZ.

Bird assumptions: dip: 25°; uplift rate: 0.2 mm/yr.

SRT assumptions: dip: 38° ± 3°; uplift rate: 0.18 ± 0.03 mm/yr.

Overall Assessment of the Bird Critique

a. PG&E (2015, 2024) underestimated the hazard to DCPP from thrust faulting under the Irish Hills because it made four false assumptions. Removing these assumptions increases the thrust-faulting potency rate by a large factor.

   SRT finding: *Removing the four false assumptions in the development of a revised SSC would have little to no impact on the hazard estimates*.

b. Three independent analytic methods give values for the total slip rate on shallow-dipping thrust faults under the Irish Hills in the range of 2.0-2.8 mm/yr.

   SRT finding: *Slip rate of the SWBZ thrust faults under the Irish Hills is estimated to be 0.29 ± 0.07 mm/yr, an order of magnitude smaller than Bird's estimates.*

Overall Assessment of the Bird Critique

c. The January 1, 2024, Noto Peninsula (Japan) earthquake (**M**7.5) is a good analog for a large thrust event beneath the Irish Hills.

SRT finding: *A Noto24-type earthquake is not suitable as a characteristic earthquake for thrust faulting beneath the Irish Hills.*

d. The recurrence interval of Noto24-type earthquakes involving Irish Hills thrust faulting is 715-1000 yr, which poses an unacceptable risk to DCPP.

SRT finding: *If Noto24 were adopted as the characteristic event for the Irish Hills, the estimated recurrence interval would be ten to twenty times longer than Bird's estimates.*

Overall Assessment of the Bird Critique

SRT finding: *The best available science does not support the four main assertions of the Bird critique.*

Findings Regarding the SSC Model

- Existing SSC FMGs, with modifications to include a lower range of dip for the SWBZ, can adequately represent the hazard of thrust faulting beneath the Irish Hills.
- Fault system analysis favors the SW-Vergent FGM over the NE-Vergent and Outward-Vergent FGMs in representing what is known about the style of faulting in the SLPB system.
- Though the Los Osos trend displays evidence for neotectonic activity, this evidence does not require reverse slip on a Los Osos reverse fault.
- Observed dip of SWBZ faulting ranges between 25° and 56° with a mean dip of $38^{o} \pm 3^{o}$, which is below the dip range allowed by the SW-Vergent FGM (45^{o}-50^{o})
- SRT's preferred rate estimate for the SWBZ (0.29 ± 0.07 mm/yr) is marginally higher than the estimate from the SW-Vergent FGM (0.17 ± 0.05 mm/yr) partially because the assumed fault dip is lower

Summary of Recommendations

The SRT recommends:

1. Development of a set of kinematically constrained structural models for reverse faults underlying the Irish Hills that can explain the folding observed since 5 Ma.
2. Dating of low-stand abrasion platforms offshore, south of the Irish Hills, to further constrain the rate of footwall subsidence and its contribution to the SWBZ slip rate.
3. Monitoring of IRSL-dating efforts and reassessment, if necessary, of the MIS 5 age assignments for the Q1 and Q2 terraces surrounding the Irish Hills.
4. Further investigation of potential strike-slip faulting along the Los Osos trend and its impacts on the pattern of marine-terrace uplift.

Summary of Recommendations

5. PG&E should follow up the SRT's preliminary work with a more complete study of the available GPS data.
6. The fault slip models that underlie the DCPP SSC should be developed into kinematic and mechanical models that can predict the interseismic deformation and can thus be directly tested against the GPS data.
7. PG&E should compute the transpressional ratios for the SSC24 slip models and compare the values with the geodetic constraints.
8. Geologic slip-rate information should be acquired from the Rinconada and Huasna faults to permit better modeling of the shear component evident in the GPS data.

Summary of Recommendations

9. PG&E should conduct modeling experiments to ascertain the sensitivity of DCPP hazard to the SSC modifications recommended by the SRT

- Decrease the mean dip of the SWBZ faulting to agree with the observed average ($38^{o} \pm 3^{o}$)
- Reweight FMGs to favor the SW-Vergent model over the NE-Vergent and Outward-Vergent models
- Down-weight the hazard of the Los Osos reverse trend

End

Diablo Canyon Annual Assessment Meeting

2024 Reactor Oversight Process

Nuclear Regulatory Commission – Region 4

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Our Mission

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- The NRC protects public health and safety and advances the nation's common defense and security by enabling the safe and secure use and deployment of civilian nuclear energy technologies and radioactive materials through efficient and reliable licensing, oversight, and regulation for the benefit of society and the environment.

NRC Strategic Plan Goals

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Safety and Security – Ensure the safe and secure use of radioactive materials
- Organizational Health – Continue to foster a healthy organization
- Stakeholder confidence – Inspire stakeholder confidence in the NRC

NRC Annual Assessment Summary

Diablo Canyon

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- PG&E operated the plant safely and in a manner that preserved the public health and safety and protected the environment.

- Diablo Canyon Units 1 & 2 were in the Licensee Response Column of the NRCs ROP Action Matrix at the end of 2024.

NRC Inspection Activities
Diablo Canyon 2024

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- ~7500 hours of inspection and related activities
- 2 resident inspectors on site – residents make four quarterly inspection reports per year and walk through the plant every day
- 10 regional inspections
- 3 major team inspections
  - License Renewal
  - Aging Management
  - Problem Identification and Resolution

Diablo Canyon PIs and Findings

January 1 through December 31, 2024

- All 17 Performance Indicators for each unit (including Security) were Green
- 11 Green / Severity Level IV inspection findings

NRC Resident Inspection Findings

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Failure to maintain annunciator response procedure (IR 2024-001)
- Inadequate maintenance rule evaluations on condenser steam dump system (IR 2024-001)
- Failure to remove valve parts results in reactor trip at low power (IR 2024-001)

NRC Resident Inspection Findings

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Failure to consider appropriate performance criteria for maintenance rule components (IR 2024-001)
- Failure to maintain original design specifications after maintenance (IR 2024-001)
- Failure to make an interim Part 21 report (IR 2024-001)

NRC Resident Inspection Findings

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Failure to correctly determine operability of auxiliary building ventilation fan (IR 2024-002)

- Failure to preclude repetition of the bearing failure of the auxiliary saltwater pump 2-2 (IR 2024-010)

Significance Threshold

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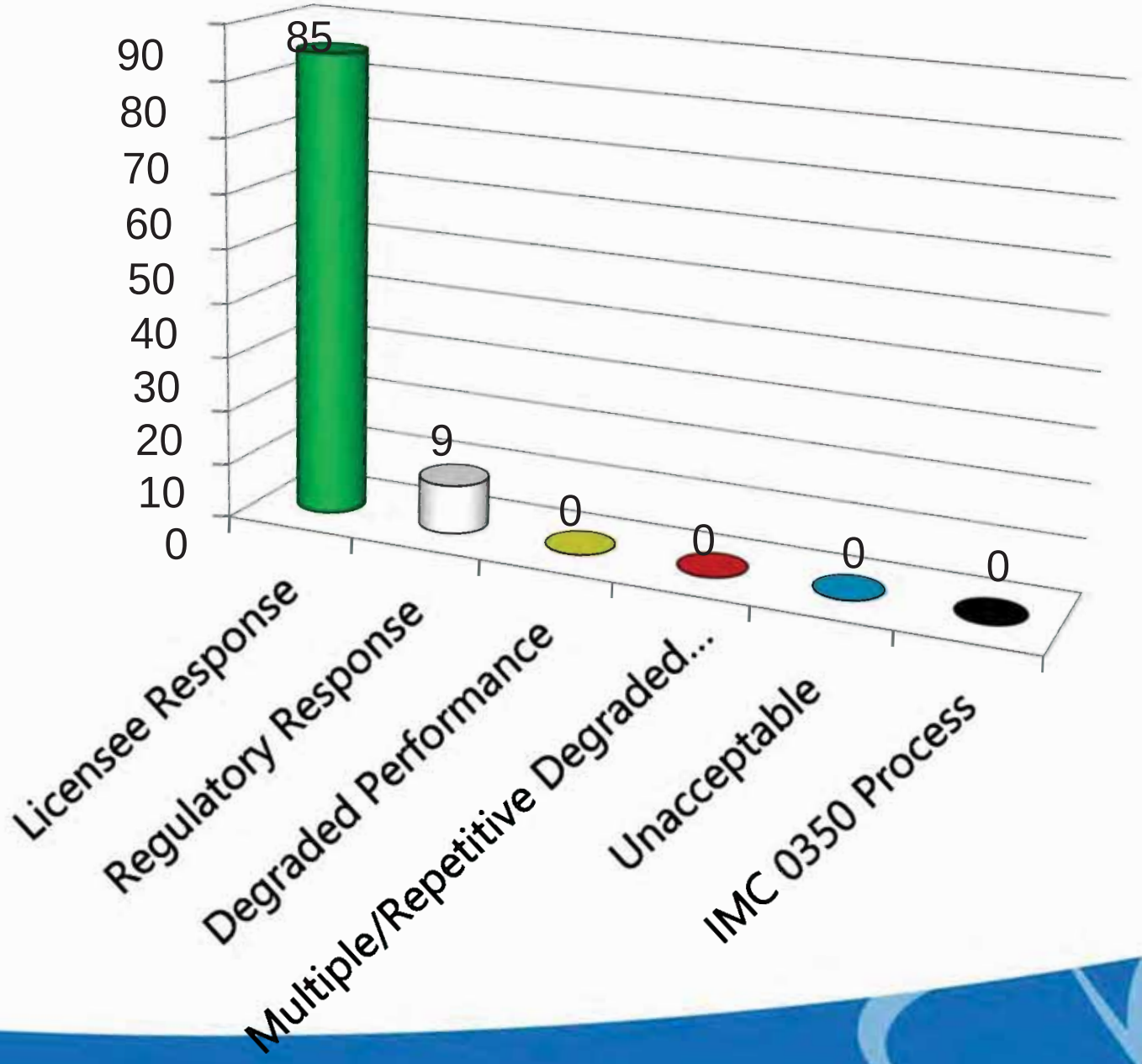
Performance Indicators

- Green — Baseline Inspection
- White — Requires additional NRC oversight
- Yellow — Requires more NRC oversight
- Red — Requires most NRC oversight

Inspection Findings

- Green — Very low safety or security significance finding
- White — Low to moderate safety or security significance finding
- Yellow — Substantial safety or security significance finding
- Red — High safety or security significance finding

Industry-Wide Performance



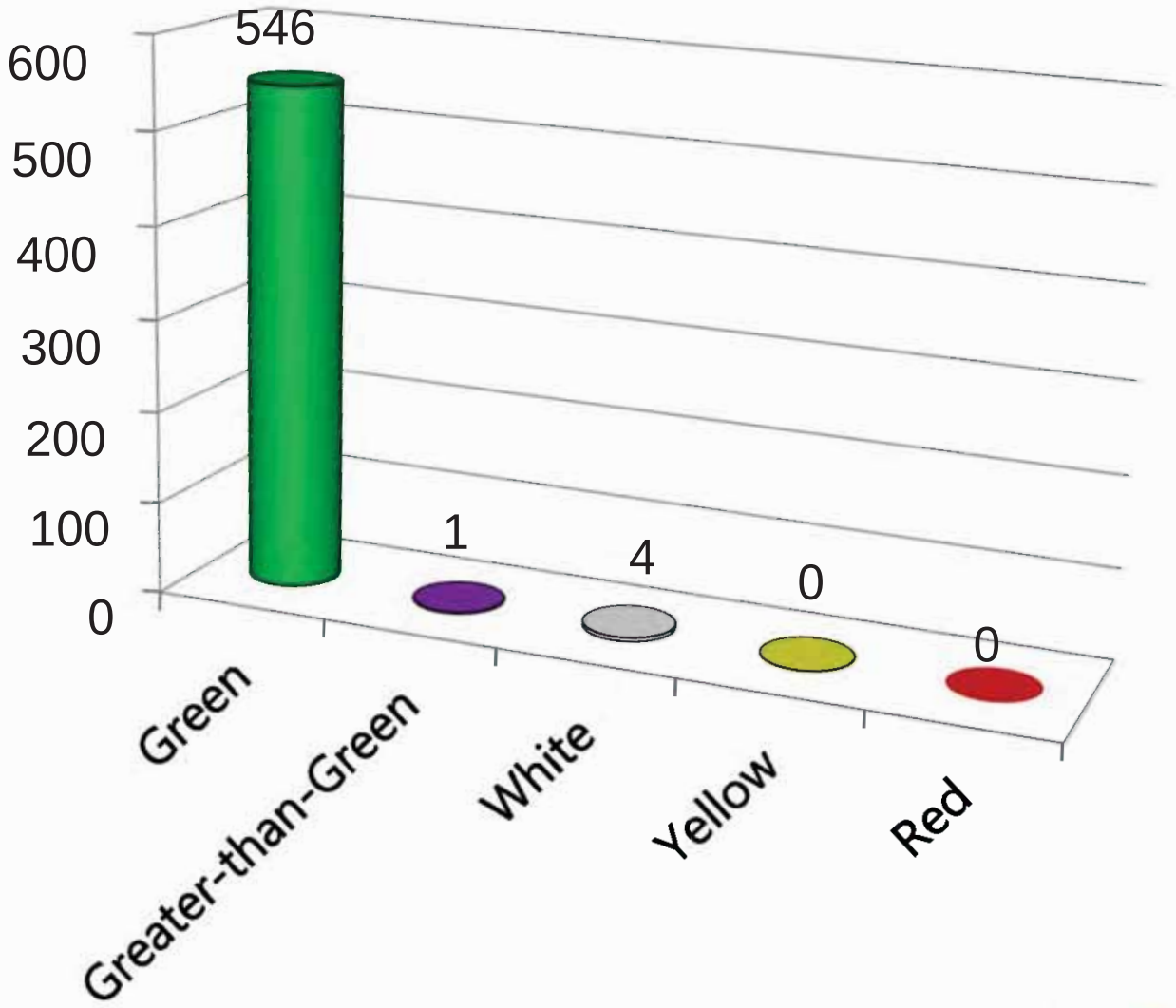
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

As of 12/31/2024

Industry-Wide Inspection Findings

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

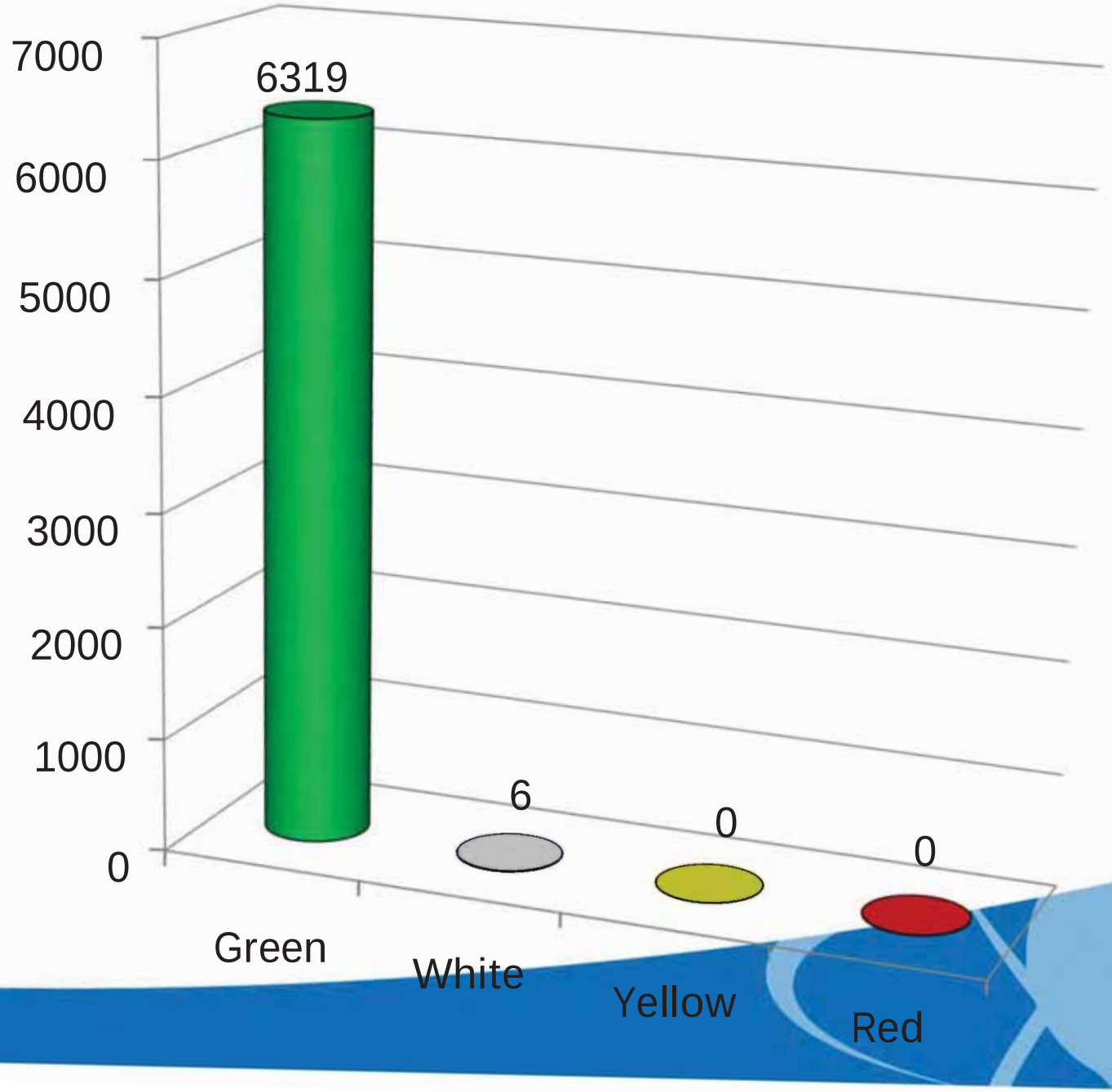
Finding data current as of 02/19/2025



Calendar Year 2024 data

Industry-Wide Performance Indicators

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment



Calendar Year

2024 data

NRC Plans for 2025

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- NRC plans baseline inspections at Diablo Canyon for the remainder of 2025. This includes:
  - Triennial Fire Protection
  - Cyber Security

NRC Social Media Channels

- Facebook: https://www.facebook.com/nrcgov/
- Twitter: https://twitter.com/nrcgov
- YouTube: https://www.youtube.com/user/NRCgov
- Flickr: https://www.flickr.com/photos/nrcgov/sets
- LinkedIn: https://www.linkedin.com/company/u-s--nuclear-regulatory-commission/mycompany/
- GovDelivery: https://service.govdelivery.com/accounts/USNRC/subscriber/new

Contacting the NRC

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Report an emergency
  - (301) 816-5100 (call collect)
- Report a safety concern
  - (800) 695-7403
  - Allegation@nrc.gov
- General information or questions
  - *www.nrc.gov*

Najmedin Meshkati, Member, with Richard McWhorter, Consultant

1. Outage Management Overview
2. High-Pressure Turbine Replacement Update and Plant Tour
3. Observe Outage Maintenance Activity
4. Cause Evaluation Process
5. Root Cause Evaluation for Auxiliary Saltwater Pump Motor Failure
6. Auxiliary Saltwater Discharge Arrangement, Area Tour, and FLEX Program
7. Observe 0730 Senior Leadership Team Outage Briefing
8. Meet with Nuclear Regulatory Commission (NRC) Resident Inspector
9. Containment Tour
10. Meet with DCPP Officer
11. Review of Anonymous Notification Trends
12. Station Update

Outage Management Overview

- High-Level Schedule for Refueling Outage 1R25
- Status of Major Outage Activities
  - Vessel Embrittlement Capsule B Successfully Removed and Contents Shipped Offsite to Independent Laboratory in Early May
  - Testing and Analysis Expected to Take at Least 12 Months to Complete
- Emergent (Discovery) Issues

Conclusion: DCPP appeared to be managing well the schedule and scope of work for Refueling Outage 1R25.

High-Pressure (HP) Turbine Replacement Update and Plant Tour

- HP Turbine at End of Life Based on Last Inspection Data
- One New Rotating Element and Eight New Stator Elements
- Upper and Lower Casings Retained
- Erosion on Sealing Surfaces Discovered to be Much Higher than Expected
- Significant Weld Repairs Required; Contingency Plan Prepared Before Outage
- Toured Work Area – Clean and Safe Working Environment

Conclusion: The replacement of DCPP Unit 1's HP Turbine was proceeding satisfactorily. Due to the discovery of higher-than-expected erosion on internal sealing surfaces, DCPP implemented a contingency plan for increasing the scope and duration of the work. The FFT considered that this type of proactive pre-planning was commendable and enhanced safety.

Mr. McWhorter and Dr. Meshkati at Replacement HP Turbine Stator Elements

DCPP Technician and Dr. Meshkati Under HP Turbine Upper Casing

Observe Outage Maintenance Activity

- Reviewed Pre-Planning and Risk Reduction Activities for Snubber Removal Near Component Cooling Water (CCW) Heat Exchanger 1-1 (Operating)
- Risk Management Plan
  - Briefing Details; Rigging Plans and Inspections
  - Communications with Operations; Verification of Correct Components
  - Robust Physical Barriers; Actions if Unexpected Conditions Occurred
- Inspected Work Area to Verify the Above Risk Management Activities in Place

Conclusion: DCPP's planning for a work activity that required a formal risk evaluation and the implementation of a Risk Management Plan were appropriate and performed in accordance with applicable risk management procedures to ensure that nuclear safety was adequately maintained.

Cause Evaluation Process

- Follow-up from January Fact-Finding Meetings
  - Reviews/Questions Focused on Use of Organizational Learning Tool (OLT)
  - Reviewed OLTs in ~16 Cause Evaluations and 1 Root Cause Evaluation
  - Discussed How and Why OLTs are Used and Process for Implementing Corrective Actions for Issues Identified in the OLTs
- DCPP Open to Discussing Comments and Recommendations for Improvement

(continued)

Cause Evaluation Process (continued)

Conclusion: DCPP's program for the use of its Organizational Learning Tools and Safety Culture Assessments as a part of Cause Evaluations and Root Cause Evaluations was generally effective in capturing and initiating appropriate corrective actions for organizational deficiencies. Areas for improvement were discussed, and PG&E initiated two Notifications to prompt further action.

Recommendation to the DCISC: The following previous recommendation to the DCISC was completed during this Fact-Finding Meeting and is recommended for closure: *The DCISC should review the Organizational Learning Tool and Safety Culture sections in all Root Cause Evaluations and Cause Evaluations conducted in 2024 (D1/25FF-3.3).*

(continued)

Cause Evaluation Process (continued)

Recommendation to PG&E: The following previous recommendation to PG&E was reviewed and remains open: *PG&E should review its cause evaluation processes and initiate actions to ensure that deficiencies observed via the Organizational Learning Tool and Safety Culture Assessment are captured and tied to the initiation of appropriate corrective actions (P1/25FF-3.3A).* PG&E has accepted this recommendation and is working to address it under Notification 51282784.

Recommendation to PG&E: The following previous recommendation to PG&E was reviewed and remains open: *PG&E should review its cause evaluation processes and initiate actions to ensure that periodic trending is performed across the multiple Organizational Learning Tools and Safety Culture Assessments that are performed as a part of Cause Evaluations and Root Cause Evaluations (P1/25FF-3.3B).* PG&E has accepted this recommendation and is working to address it under Notification 51269205.

Cause Evaluation for Auxiliary Saltwater Pump 2-2 Failure

- Failure of ASW Pump 2-2 Motor Bearing in Fall 2023; Repeat of 2018 Failure
- Issue of Procedure Guidance and Methods for Setting Axial Pre-Loading
- Follow-up From DCISC Reviews in December 2023; May and November 2024
- New Procedure Changes Sufficient and Validated by Use During Overhaul
- Notification on Why 2018 Procedure Changes Were Ineffective Remains Open

(continued)

Cause Evaluation for Auxiliary Saltwater Pump 2-2 Failure (continued)

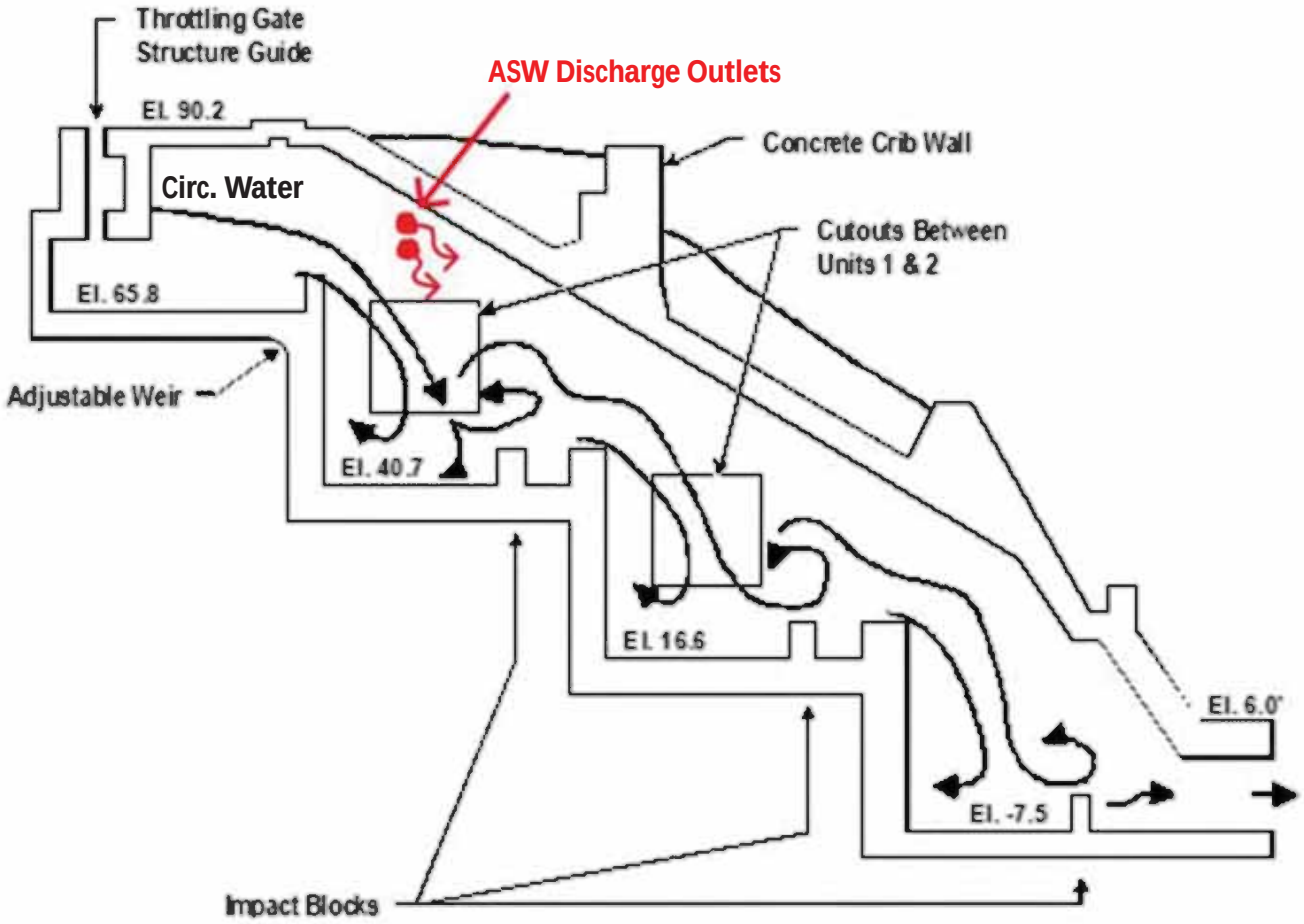
Conclusion: PG&E was continuing to evaluate why procedure changes made as a result of a 2018 Root Cause Evaluation for an Auxiliary Saltwater Pump motor bearing failure were not sufficiently effective to prevent the recurrence of a similar issue in 2023.

Recommendation: The following previous recommendation to PG&E was reviewed and remains open: *PG&E should continue to evaluate why a 2018 Root Cause Evaluation for a failed Auxiliary Saltwater Pump motor bearing did not result in sufficiently effective procedure changes (P11/24FF-3.11).* PG&E has accepted this recommendation and is working to address it under Notification 51225061.

Auxiliary Saltwater Discharge Arrangement, Tour, and FLEX Program

- Follow-up from January 2025 Discussions on New Tsunami Analysis
- Post-January Visit, Drawing Provided Raised Question on Configuration of Auxiliary Saltwater (ASW) Discharge Piping in Discharge Structure
- ASW Discharges Located Under Concrete Structure and Earthen Fill
- Discussed Configuration and Toured Area
- Not a Regulatory Concern; Addressed in Safety Analysis Report
- Questioned Why No Guidelines for Loss of ASW Discharge Included in FLEX Program
- PG&E Agreed to Research Question Further and Provide a Future Response

(continued)



ASW Discharge Arrangement in Discharge Structure

Mr. McWhorter and Dr. Meshkati at Discharge Structure Lower Level

Auxiliary Saltwater Discharge Arrangement, Tour, and FLEX Program (continued)

Conclusion: The DCISC found that a possible collapse of the DCPP Discharge Structure onto the Auxiliary Saltwater discharge outlets was highly unlikely but possible. This scenario should be further reviewed to determine if it should be included as a part of the FLEX Program. A tour of the Discharge Structure found it to be in sound condition with small amounts visible degradation from its exposure to the weather and saltwater.

(continued)

Auxiliary Saltwater Discharge Arrangement, Tour, and FLEX Program (continued)

Recommendation for the DCISC: The following previous recommendation to the DCISC was completed and is recommended for closure based on being folded into an associated recommendation to PG&E below (P4/25FF-3.6): *The DCISC should further review if DCPP should have considered developing FLEX procedures for providing an alternative discharge path for the ASW System following a Beyond Design Basis event that may cause a collapse of the Discharge Structure (D1/25FF-3.12).*

Recommendation to PG&E: PG&E should review if DCPP should have considered developing FLEX guidelines for providing an alternative discharge path for the ASW System following a Beyond Design Basis event that may cause a collapse of the Discharge Structure or otherwise obstruct the ASW System discharge (P4/25FF-3.6). PG&E has accepted this recommendation and is working to address it under Notification 51283374.

Observe 0730 Senior Leadership Team (SLT) Outage Briefing

- Meeting purpose was to provide the SLT with a forum to review the status of outage activities and review or approve decisions as desired. Items discussed:
  - Safety, Human Performance, and Dose Updates
  - Outage and Operating Unit Plant Status
  - Emerging Issues Update
  - Project Update
  - Observation Insights
  - Notification Review Team Package Review

Conclusion: The April 28, 2025, 0730 Senior Leadership Team Outage Briefing was conducted efficiently and effectively. Major issues and action items were concisely discussed and appropriate direction given by senior leaders.

Meet with NRC Resident Inspectors

- Items Discussed Included:
  - DCPP's FLEX Program and the Associated Regulatory Requirements
  - NRC Rules for Overtime Limits
  - NRC Specialist Inspection Topics and Periodicities
  - Recent NRC Inspection Findings

Conclusion: DCISC's meetings with the NRC continue to be beneficial.

Containment Tour

- 140' Level – Ventilation Equipment, Refueling Equipment, Steam Generator and Pressurizer Enclosures, and the Reactor Cavity (with Lower Internals Removed)
- 115' Level – Seal Table, Reactor Coolant Pump 1-3 and 1-4 Enclosures
- 91' Level – Safety Injection Accumulators and Bio-shield Entry Area

Conclusion: The DCISC Fact-Finding Team toured the DCPP Unit 1 Containment and found that all observed areas and equipment were in good condition.

Mr. McWhorter, Mr. Soenen, and Dr. Meshkati at the Reactor Cavity

Mr. McWhorter, Mr. Soenen, and Dr. Meshkati at the Nuclear Instrument Seal Table

Mr. Soenen and Dr. Meshkati at Reactor Coolant Pump 1-3 Motor/Pump Coupling

Meet with DCPP Officer

- Maureen Zawalick, Vice President, Business and Technical Services
- Discussed Plans for a June 17 Meeting Between Dr. Meshkati and Members of the Safety and Nuclear Oversight Committee of the PG&E Board of Directors

Conclusion: The regular meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.

Review of Anonymous Notification Trends

- Follow-up Item from January Fact-Finding Meetings Regarding Reviewing Anonymous Notifications Submitted in 2024 for Trends

	2022	2023	2024
Anonymous Notifications	121	83	88

- No Significant Trends
- Most Anonymous Notifications Unrelated to Nuclear Safety

(continued)

Review of Anonymous Notification Trends (continued)

Conclusion: Most of the anonymous notifications submitted at DCPP in the last two years were for matters unrelated to nuclear safety. The DCISC's brief review of the list of ascribed titles of anonymous notifications by staff of the Employee Concerns Program did not find any visible pattern of significant safety concerns.

Recommendation: The following previous recommendation to the DCISC was completed during this Fact-Finding Meeting and is recommended for closure: *The DCISC should further review the numbers and nature of anonymous Notifications received in 2024 for any significant themes or concerns (D1/25FF-3.9B).*

Station Update

- Station Update:
  - Power Production
  - Refueling Outage 1R25 Discovery of Additional Work Scopes
  - Major Projects
  - Human Performance

Conclusion: DCPP's update on recent station activities was informative, and no new major issues were identified.

Najmedin Meshkati, Member, with Richard McWhorter, Consultant

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9. Containment Tour
10. Meet with DCPP Officer
11. Review of Anonymous Notification Trends
12. Station Update

Robert Budnitz, Member, with Richard McWhorter, Consultant

1. Workplace Seismic Safety
2. High-Pressure Turbine Replacement Update and Plant Tour
3. Chemistry Program
4. Meet with DCPP Officer
5. Foreign Material Exclusion Program
6. Intake Structure Tour
7. Observe Senior Leadership Team Outage Briefing
8. Large Transformers
9. Observe Outage Scope Review Team and Daily Notification Review Team Meeting
10. Observe Corrective Action Review Board Meeting
11. Station Update
12. Management Observation Program

Workplace Seismic Safety

- Follow-up To Issue Identified in December 2024 – Unbraced Cabinet in Chief Nuclear Officer's Office
- Recommendation (P12/24FF-3.6): PG&E should review why an extent of condition for an unbraced cabinet found by the DCISC in July 2024 did not prevent the identification of a similar condition....
- Corrective Actions Completed:
  - Updated Site Standard
  - New Checklist and Assignment of Areas for Inspection
  - New Preventive Maintenance Procedure for Annual Inspections
  - Full Round of Inspections Completed

(continued)

Workplace Seismic Safety (continued)

Conclusion: DCPP provided an update on corrective actions being taken in response to the DCISC's identification of an unbraced cabinet in December 2024. Corrective actions appeared appropriate and should prevent the recurrence of similar issues in the future. The DCISC will continue to regularly review the status of this program under its Open Items List item number SC-12.

Recommendation: The following previous recommendation to PG&E was reviewed during this meeting and is recommended for closure: PG&E should review why an extent of condition for an unbraced cabinet found by the DCISC in July 2024 did not prevent the identification of a similar condition by the DCISC in December 2024 (P12/24FF-3.6).

High-Pressure (HP) Turbine Replacement Update and Plant Tour

- HP Turbine at End of Life Based on Last Inspection Data
- Erosion on Sealing Surfaces Discovered
- Significant Weld Repairs Completed
- Alignment of Stationary Blade Assemblies In-Progess
- Toured Work Area – Clean and Safe Working Environment

Conclusion: The planned replacement of DCPP's High-Pressure Turbine was proceeding satisfactorily. The DCISC Fact-Finding Team toured the work area and found that it was clean, well-organized, and provided a safe work environment for employees.

Chemistry Program

- Program Prevents Corrosion in Primary and Secondary Systems
- Effectiveness Measured Primarily by Chemistry Effectiveness Indicator (CEI)
  - Unit 1 CEI Steady at 0.0 (No Issues)
  - Unit 2 at 0.0; Just Recovered from 18 months of CEI at 1.3.
  - Unit 2 Non-Zero CEI Driven by Issue in October 2023 When Condenser Tube Leakage Contaminants Failed to be Fully Removed by Condensate Polishers
- PG&E Working to Monitor/Plug Leaking Condenser Tubes and Coat Tubesheets

Conclusion: DCPP's Chemistry Program was performing well with no major issues.

Meet with DCPP Officer

- Maureen Zawalick, Vice President, Business and Technical Services
- Discussed the Fact-Finding Agenda Items and Other Items of Mutual Interest

Conclusion: The regular meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.

Foreign Material Exclusion (FME) Program

- Program Prevents Potentially Harmful Intrusion of Foreign Materials into Plant Systems or Components
- Controlling Procedure Received Significant Revisions in 2024
- Performance During Last Three Outages:

	Conditions	Threats	Events
1R24	15	1	0
2R24	3	0	0
1R25	2	0	0

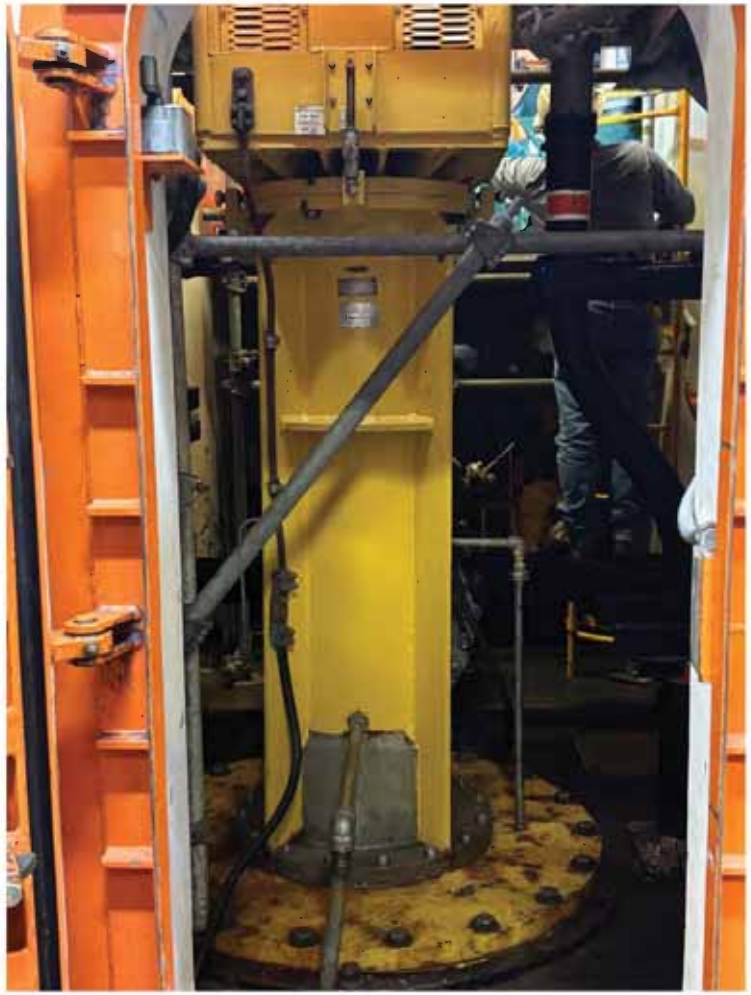
Conclusion: DCPP's Foreign Material Exclusion Program was performing well with no major issues.

Intake Structure Tour

- Specific DCISC Focus Area for Periodic Monitoring (Open Items List SE-39)
- Area in Good Condition with Outage Work Mostly Complete (Primarily Traveling Screen Replacements)
- Concrete in Good Condition with Only Small Amounts of Unrepaired Degradation from its Exposure to the Weather and Saltwater

Conclusion: A tour of the Intake Structure found it to be in good condition with only small amounts of concrete degradation.

Mr. McWhorter and Dr. Budnitz at Intake Structure



Auxiliary Saltwater Pump 1-1

Observe Senior Leadership Team (SLT) Outage Briefing

- Meeting purpose was to provide the SLT with a forum to review the status of outage activities and review or approve decisions as desired. Items discussed:
  - Safety, Human Performance, and Dose Updates
  - Outage and Operating Unit Plant Status
  - Emerging Issues Update
  - Project Update
  - Observation Insights
  - Notification Review Team Package Review

Conclusion: The May 8, 2025, Senior Leadership Team Outage Briefing was conducted efficiently and effectively. Major issues and action items were concisely discussed and appropriate direction given by senior leaders.

Large Transformers

- 14 Total Large Transformers at DCPP; All in Good Health
- DCPP Completed Addressing Multiple Minor Issues in Recent Outages:
  - Oil and Conservator Leaks
  - Oil Replacements and Internal Inspections
  - Fan Repairs
  - Corrosion Removal and Recoating
- New Lifecycle Management Plan Draft in Review
- Spare Relocations to be Completed in Summer 2025

Conclusion – DCPP's Large Transformers were in acceptable health overall. During recent refueling outages, several significant maintenance activities were completed to support operations through 2030.

Observe Outage Scope Review Team and Daily Notification Review Team Meeting

- Combined Meeting Reviewed Approximately 40 Equipment-Related Notifications (Corrective Action Program Deficiency Reports)
- Dispositioned Each Item with Regards to Priority for Future Action and Whether to Add Corrective Work Items to the Scope of the Ongoing Refueling Outage 1R25

Conclusion: The May 8, 2025, meeting of the Outage Scope Review Team and Daily Notification Review Team was conducted efficiently and effectively. The team appropriately reviewed and dispositioned approximately 40 Notifications from the previous shift.

Corrective Action Review Board (CARB)

- Provides Senior Management Oversight of the Corrective Action Program
- Meeting Agenda Included Reviewing Routine Items and One Focused Item, an Institute of Nuclear Power Operations Event Report

Conclusion: The May 8, 2025, DCPP Corrective Action Review Board meeting covered items on the agenda efficiently while allowing adequate time for any participants to question and discuss items of interest in more detail. There was good participation by CARB attendees.

Station Update

- Station Update:
  - Power Production
  - Major Projects
  - Human Performance
  - Regulatory Performance

Conclusion: DCPP's update on recent station activities was informative, and no new major issues were identified.

Management Observation Programs

- Focused on Requiring Supervisors to Routinely Observe Employees in the Field and Discuss Their Observations in a Collaborative Fashion
- Data From Observations Made Within Departments Rolled Up Into Station-Wide Tracking Program
- 2,797 Observations Made January 1 to May 12 (Including Portions of 1R25)
- 1,246 Observations Made Mid-September to Mid-December (Including 1R24)
- Strengths and Opportunities Categorized and Tracked; Also Reviewed at Departmental Observation Review Meetings

Conclusion: Management Observation Programs were being properly implemented. A large number of observations were being completed, and the observations provided valuable insights into human performance.

Robert Budnitz, Member, with Richard McWhorter, Consultant

1. Workplace Seismic Safety
2. High-Pressure Turbine Replacement Update and Plant Tour
3. Chemistry Program
4. Meet with DCPP Officer
5. Foreign Material Exclusion Program
6. Intake Structure Tour
7. Observe Senior Leadership Team Outage Briefing
8. Large Transformers
9. Observe Outage Scope Review Team and Daily Notification Review Team Meeting
10. Observe Corrective Action Review Board Meeting
11. Station Update
12. Management Observation Program