October 15, 1964

50-265

Dr. Herbert Kouts
Chairman, Advisory Committee
on Reactor Safeguards
U. S. Atomic Energy Commission
Washington, D. C.

Dear Dr. Kouts:

Transmitted herewith for the use of the Committee are eighteen copies of the Seismicity and Tsunami Report on Bodega Head, California, dated October 1964, prepared by the U. S. Department of Commerce, Coast and Geodetic Survey.

Sincerely yours,

Original Signed By
R.L. Doan

R. L. Doan, Director
Division of Reactor Licensing

Enclosures:
As stated above

OFFICE ▶	RL	RL				
SURNAME ▶	EGCase:bh	RLDoan				
DATE ▶	10/15/64	10/15/64				

MEMO ROUTE SLIP
Form AEC-93 (Rev. May 14, 1947)

See me about this.	For concur	For action.	
Note and return.	For signature.	For information.	

TO (Name and unit)	INITIALS / DATE	REMARKS
Joe Fouchard, DPI, HQ Harold Price, REG, HQ		Attached is clip from "PG&E Progress", October 1964
Robert Lowenstein, REG, HQ Richard L. Doan, REG, HQ		
R. W. Smith, Compl. V., SAN		

FROM (Name and unit)	REMARKS
Rodney L. Southwick Asst. to the Manager for Public Information	

PHONE NO. | DATE 10/12/64

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AEC License Goal of Young Nuclear Auxiliary Operator

On the Job With JAMES SEXTON

O[illegible]F AND ON THE JOB, Jim Sexton has [illegible] above, young auxiliary operator at PG&E's nuclear [illegible] Eureka discusses work with Foreman Don Voss. [illegible] for afternoon of fun as skydiver.

[illegible] events have happened [illegible] during the past seven years for James A. Sexton. In that time he was graduated from high school, got married, started a promising career in the field of nuclear power, served with the Army under fire in Vietnam and took up skydiving.

Son of a control operator at PG&E's Oleum power plant in Contra Costa County, Jim Sexton is an auxiliary operator at the company's nuclear plant in Eureka. Off, and on the job, he spends long hours preparing for a detailed examination by which he will qualify as a licensed nuclear plant operator.

The fascinating world of nuclear energy was just unfolding when Jim Sexton joined PG&E as a machinist's helper at Martinez Power Plant in 1958. Weeks later he became an operations helper at Oleum, where his father, Arthur C. Sexton, works.

While serving as an oiler at PG&E's big Pittsburg power plant, [illegible] was selected for training at the [illegible]. He had [illegible] several months of the [illegible] study period when he [illegible] leave for a two-year Army stretch.

After training at Fort Ord and Fort Lewis he was sent to Alaska on a field exercise that included duty inside the Arctic Circle at temperatures down to 78 degrees below zero. Shipped to Vietnam in May 1963 he found himself in the thick of the Southeast Asia action as a driver for Brig. Gen. Joseph W. Stilwell, Jr.

Resuming his job at Eureka [illegible] July, Jim faced at least six more months of study before he attempts the 10-hour written examination which could lead to a license from the Atomic Energy Commission. Before achieving this he must master the details of radiation, safety, nuclear theory and plant operations.

As a pleasant break from work and study, Jim Sexton spends part of his Sundays making from one to three parachute jumps from a Cessna 95 aircraft at from 3,200 to 4,500 feet. The hobby is an outgrowth of helicopter duty in Saigon and he has convinced his wife, Carol, a lumber company secretary, that it is a very safe sport.

Next to earning his AEC nuclear plant license his great ambition is to qualify for a license from the Parachute Club of America.

Nuclear Plant One Year Old

Continued from Page [illegible]

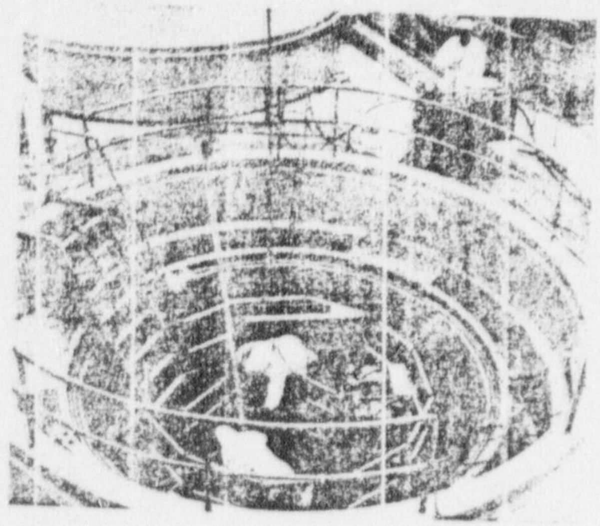
generating unit goes back on the line to continue providing energy to a burgeoning California.

Humboldt Bay is Pacific Gas and Electric Company's second power plant to use steam generated through the use of nuclear fuel. The first was in cooperation with General Electric at Vallecitos in Alameda County. It started delivering electricity to PG&E customers in October, 1957. As research turned to newer developments in nuclear generation, the GE boiling water reactor was "retired" in late 1963 and [illegible] "superheat" reactor. PG&E participated in building the Dresden Nuclear Power Station near Chicago, Illinois, which went into operation in 1960. PG&E is also associated with the Peach Bottom Atomic Plant, an advanced-design nuclear plant near Philadelphia. It is expected to go into operation late this year.

PG&E's atomic power development program always has had large, economical plants as its prime objective. From the beginning, men guiding PG&E's program have known that the atom will achieve its ultimate role in energy production only when it produces electricity to serve a large, diversified power market as economically and as reliably as other fuels. The atom is expected to do this in Sonoma County, California, where PG&E proposes to build its largest atomic power project—Bodega Bay Atomic Park. The station would have a generating capacity of 325,000 kilowatts, enough to serve a city of half a million people. PG&E is currently waiting for the AEC to hold public hearings on the proposed plant and rule on the company's application for a permit.

SAN FRANCISCO, OCTOBER 19[illegible]

Nuclear Plant One Year Old



WORKMEN prepare to add 14 fuel assemblies at Humboldt Nuclear plant reactor. The new fuel supplements 172 assemblies which have been in place since the nuclear generating unit went into operation. An assembly consists of 49 stainless steel tubes in which uranium dioxide pellets are sealed.

Fuel Added For First Time at Eureka

The instructions to the incoming shift were routine, nothing special at all. They read, "Lower electrical load on the generator, separate generator from [illegible], insert all control rods into reactor." It wasn't long until the 52,000-[illegible] generating unit at PG&E's Humboldt [illegible] Eureka was off the line and preparations [illegible] adding new fuel to the reactor.

[illegible] in August, and the nuclear [illegible] completed more than a year of commercial [illegible] this period it had functioned [illegible] generating 425,[illegible]06,000 kilowatthours of electricity (enough to serve more than 100,000 homes annually). It did its job without fanfare or incident, not unlike 12 other nuclear power units operating today on the systems of American utilities.

1[illegible] Tons of Uranium

When PG&E's Humboldt Bay nuclear unit went into commercial service on August 1, 1963, it was loaded with 17.5 tons of an atomic fuel called uranium dioxide [illegible] an energy equivalent of 750,000 tons of coal. The fuel is contained in 172 fuel assemblies of 49 fuel rods each. The fuel produces heat which boils water in the reactor, generating steam to spin the unit's turbine-generator and make electricity.

The shutdown of the unit lasted four weeks during which time 14 new fuel assemblies were added to the [illegible] and annual maintenance work performed. [illegible] additional fuel was to supplement partially burned [illegible].

[illegible] year, with Atomic Energy Commission approval, PG&E conducted a test program which established that the unit's present capability is [illegible] 66,000 kilowatts. The company has applied to the AEC for revision of its operating license to the higher figure. Ultimate power production of 70,000 kilowatts is expected.

Simple Fuel Addition

The procedure for adding nuclear fuel is a [illegible] simple one. Because during operation the [illegible] inside the reactor vessel is 549 F, there must [illegible] hour cooling period after shutdown before [illegible] handle the apparatus which is located below floor level and housed in a steel-lined drywell. Then the 74-ton reactor shield plug is removed, followed by the steel and concrete drywell head, steam connections and other piping, thermal insulation, and finally the 45-ton alloy-steel reactor cover which is bolted in place by 36 five-inch diameter steel studs.

The last preparatory step is bolting an extension tank atop the reactor so the water level inside can be raised 10 feet. This additional water shields workers from radioactivity and permits movement of fuel assemblies without exposing them to air.

With the reactor open, work can proceed. First, fuel assemblies with the highest degree of burnup are repositioned underwater to selected locations in the core (fuel [illegible]). This done, the 14 new fuel assemblies are added. After this the reactor cover, the drywell plug, shield plug and other components are replaced. The reactor is then ready for operation. Control rods are slowly withdrawn to permit the fuel to make heat and generate steam. With this the Humboldt Bay nuclear [illegible]

MEMO ROUTE SLIP

Form AEC-93 (Rev. May 14, 1947)

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TO (Name and unit)	INITIALS	REMARKS
Joe Fouchard, DPI, HQ		Attached is clip from Santa Rosa Press Democrat, 10/11/64 "What's Delaying AEC Hearing On Bay A-Plant?"
Harold Price, REG, HQ	DATE	

TO (Name and unit)	INITIALS	REMARKS
Robert Lowenstein, REG, HQ		2. Knuth + PK
Richard L. Doan, REG, HQ	DATE 10/16/64	3. Newton

TO (Name and unit)	INITIALS	REMARKS
E. W. Smith, Compl. V., SAN		
	DATE	

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What's Delaying AEC Hearing On Bay A-Plant?

By DON ENGDAHL

As the Atomic Energy Commission's experts probe more deeply into the controversial proposal to build the Bodega Head nuclear power plant, hopes of a public hearing this year have all but vanished.

And there has been public speculation that the AEC may be trying to "warm off" Pacific Gas & Electric Co.

The utility, which nearly two years ago asked the AEC for permission to build the plant, doesn't buy that. Rather, the company subscribes to the theory that the AEC is merely doing its homework before going to public hearing.

Last week the AEC's Advisory Committee On Reactor Safeguard considered the latest PG&E answer to the latest query for more detail on a critical point—the earthquake safety of the plant.

Results of the ACRS consideration—which might be a report to the AEC on its findings, or a query for more information aren't expected to be made public for a week or so.

The ACRS, composed of leading scientists and engineers, a year and a half ago gave preliminary, conditional approval to the plant design.

One of the conditions has turned out to be the major point of emphasis — that the "... reactor and buildings not be located on an active fault line."

Subsequent excavation by PG&E of the hole that would house the reactor turned up what some geologists have said is an active fault running through the pit.

PG&E's consultants have insisted the fault is inactive, and that any movement "exceeding a fraction of an inch is extremely unlikely," and that of more than a foot "practically

The United States Geological Survey, however, concluded that movements of the rock of up to three feet in any direction might be expected.

The AEC staff members have, in three queries to PG&E since last spring, insisted on exploring the possibility of such a large movement and at accelerations of up to one times the force of gravity.

'Float' Design

PG&E has submitted a major design modification that would "float" the reactor vessel on a layer of sand (to accomodate large displacements) and in the latest amendment says the system would have "substantial margins of safety" against failure with the one-gravity figure.

It insists, however, that ground acceleration of more than a third of one-gravity is "incredible."

The extended AEC - PG&E dialogue on the earthquake question prompted the publication Nuclear Industry to say that the "extreme conditions assumed by some of the AEC's questions and the extra-ordinary demands on design which those questions imply have naturally lead to speculation that the AEC is warning PG&E that the plant will not be approved for the Bodega Bay site."

And alternative explanation, the magazine says, "is that before the AEC walks into a public hearing in this case which has aroused such intense local controversy, it simply wants to establish that every credible or incredible situation has been investigated."

PG&E View

A PG&E spokesman said the latter is the company's view that the gamut of questions that have been raised in connection with the controversial plant proposal is to be run by the AEC before the public hearing.

In view of the order of examination to which the proposed plant is now being subjected, can be gained from a new point in the utility's two latest formal "amendments" of its original application to the AEC.

In Amendment Eight, submitted July 20, the utility faced a series of questions posed in earlier letters from the AEC.

One of those asked the company to postulate a total shearing motion of the rock "along any line and in any direction in the foundation," of as much as three feet, and asked whether the structure and the leaktightness of the reactor containment building would remain intact.

PG&E pointed out that its modified design calls for the reactor containment structure to sit centered in the containment pit, with a three-foot clearance around it.

The space between reactor containment structure and the walls of the pit would be filled with water, and the structure itself sit on a "layer of carefully-selected sand of known characteristics which will permit horizontal movements of up to three feet, without impairing the function of the containment structure, although the structure might be shifted or rotated..."

There will be "no rigid structural interconnection between any major component," the amendment says, and connections between the reactor containment structure and other parts of the plant will "have sufficient flexibility to accomodate three feet of relative movement."

That, of course, is only a portion of the questions set to PG&E and only one segment of the answer.

But the AEC returned in late August with more questions bearing on the problem, which finally produced Amendment Nine, filed by the company Sept. 16.

AEC Reply

In a discussion relating to the excerpt above, the AEC wondered about the "dual requirement of flexibility to resist relative motions corresponding to a fault motion of up to three feet, and strength to resist the forces accompanying the dynamic response to the earthquake vibration."

"It has not been clearly shown . . ." the AEC said, "how the conflicting design requirements for these two sources of strain will be achieved."

The company replied that "preliminary design . . . assures that a practical design can be developed to protect the piping against failure from both a three-foot displacement through the site and the dynamic response resulting from the accelerations," and goes on to give some examples of techniques it is considering to limit the stresses in the piping.

The August questions also picked up a statement in the earlier amendment that "a detailed dynamic analysis will be made" for certain vital pieces of equipment, and asked PG&E for a full description of the acceleration to be used in the analysis.

The question goes on to specify a maximum acceleration of one times the force of gravity—where PG&E has insisted that a third of the force of gravity is a "conservative" estimate of the intensity of an earthquake force.

Without conceding that a ground acceleration of more than a third of a gravity is "credible," the company's reply concludes generally that the precise nature of the strain involved at the one-gravity acceleration can only be determined after final design of the plant.

But it says the company's proposed design criteria for critical structures, equipment and systems . . . contains substantial margins of safety against failure" for a one-gravity force.

A final question posed in August asked what would happen in the event of a three-foot fault motion elsewhere at the plant, other than through the reactor containment structure.

PG&E replied that those piping connections in the plant area "necessary for a safe shutdown of the reactor" would be made flexible enough and given protection to accommodate the motion.

All of which indicates the magnitude of questions being raised in connection with the controversial plant proposal.

Whether the latest amendment answered enough of them to satisfy the ACRS will be known shortly. Presumably the AEC staff members could still ask some more, which would further delay the date for the public hearing.

Eventually — but probably some time after the first of the year—the Bodega case will get to the hearing stage by the AEC.

It has said the public hearing will be held in Santa Rosa, but hasn't been more precise than that.

The hearing promises to be largely a technical show, but if advance billing is any indication, it will run long and be well attended.