1/C Pummill
University of Notre Dame
Major: Finance
Interview Date: 14 NOV 2013

NR Interview Notes

Schedule

0700: Arrive at NR (Navy Yard)

0715-0745: Introduction/Admin

Note: The paperwork given to the interviewers includes all technical courses taken and the grade you received in them. You have the opportunity to review these and update mistakes, so if you are unsure of your course and/or grade history, you could bring a copy of your transcript just in case.

0815: Interview #1 (20-60 minutes)

0915: Interview #2 (20-60 minutes)

1045-1300: Interview #3 (if applicable) and lunch break.

Note: MIDN are notified whether they have a third interview or are released for lunch when the feedback from the interviewers is processed. This does not occur at the same time for everyone. Some MIDN may be released for lunch (a good sign) while others have not heard yet. Just because you weren't released for lunch immediately does not necessarily mean you have a third interview.

1300: Admiral interview brief

1330-1600: Admiral interviews

Note: The sequence of interviews is alphabetical. The timing of these interviews depends on the admiral's schedule and can vary substantially. ADM Richardson is known for assigning "look-ups." Whatever you mention in your interview, be prepared for a follow up question – talk about things you know. However, look-ups are usually a good sign, as the admiral wouldn't waste time on a candidate he doesn't think he is going to pass.

1600: Paperwork

Note: All MIDN accepted into the program sign for the bonus after the admiral interviews are completed. Future submariners fill out a preference sheet for NPS. After this paperwork is done, you are free to go!

Miscellaneous

- You're allowed to bring study/reading materials while you wait. Besides your technical interviews (mine where 45 and 20 minutes) and your interview with the admiral (mine was 4 minutes) you are waiting *all* day.
  - I suggest bringing a minimum of a pencil, black pen, notebook, and something to read/study/work on.
- All materials needed will be provided during your technical interviews, including paper, pencils/pens, or other instruments. Some interviewers will provide calculators, but don't plan on it.
- You check you phone and all electronics at the door. Don't rely on a kindle or any other personal electronic devices during the day.

- You can eat and drink in the holding room. A food court and vending machines are available to you, so come prepared with money.
- There were a couple LTs and the CAPT midshipmen liaison in the holding room all day to answer questions, instructions, and advice.
- The interview process is not just about proving your technical ability – you were screened for an interview because they already think you have the potential. *Energy level, attitude, and professionalism* are hugely important and allow you to set the tone during your interviews.

Disclaimer: This is purely based on my personal experience and is by no means "set in stone." Things could change due to the number of candidates interviewing (especially since the October interview date was cancelled because of the shutdown), NR business (they still have jobs to do), and/or the admiral's schedule. However, this is a routine NR procedure and the general idea should generally be the same.

GOOD LUCK!

Description of a Typical Naval Nuclear Propulsion Plant

In Naval nuclear propulsion plants, fissioning of uranium atoms in the reactor core produces heat. Since the fission process also produces radiation, shielding is placed around the reactor to protect the crew. During a typical submerged patrol, a typical crew member receives less exposure to radiation than he would if he remained ashore and worked in an office building.

U.S. Naval nuclear propulsion plants use a pressurized water reactor design which has two basic systems: the primary system and the secondary system. The primary system circulates ordinary water in an all-welded, closed loop consisting of the reactor vessel, piping, pumps, and steam generators. The heat produced in the reactor core is transferred to the water, which is kept under pressure to prevent boiling. The heated water passes through the steam generators where it gives up its energy. The primary water is then pumped back to the reactor to be heated again.

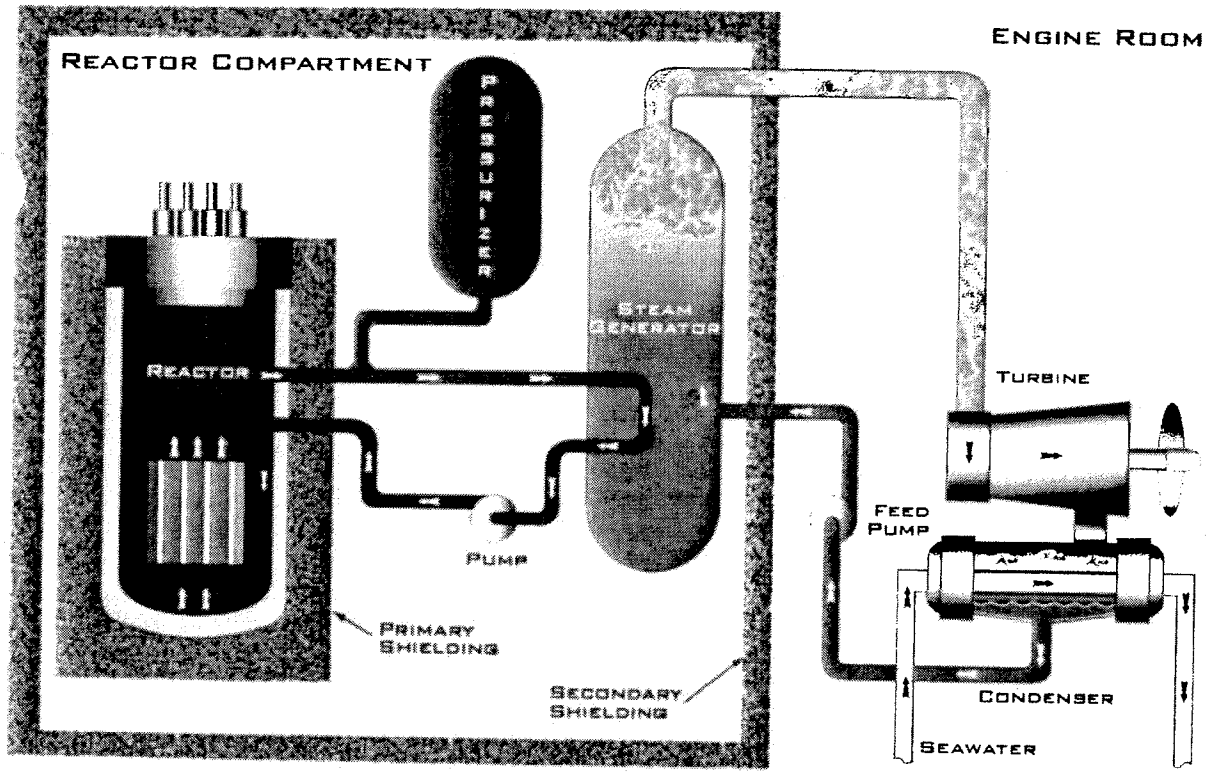
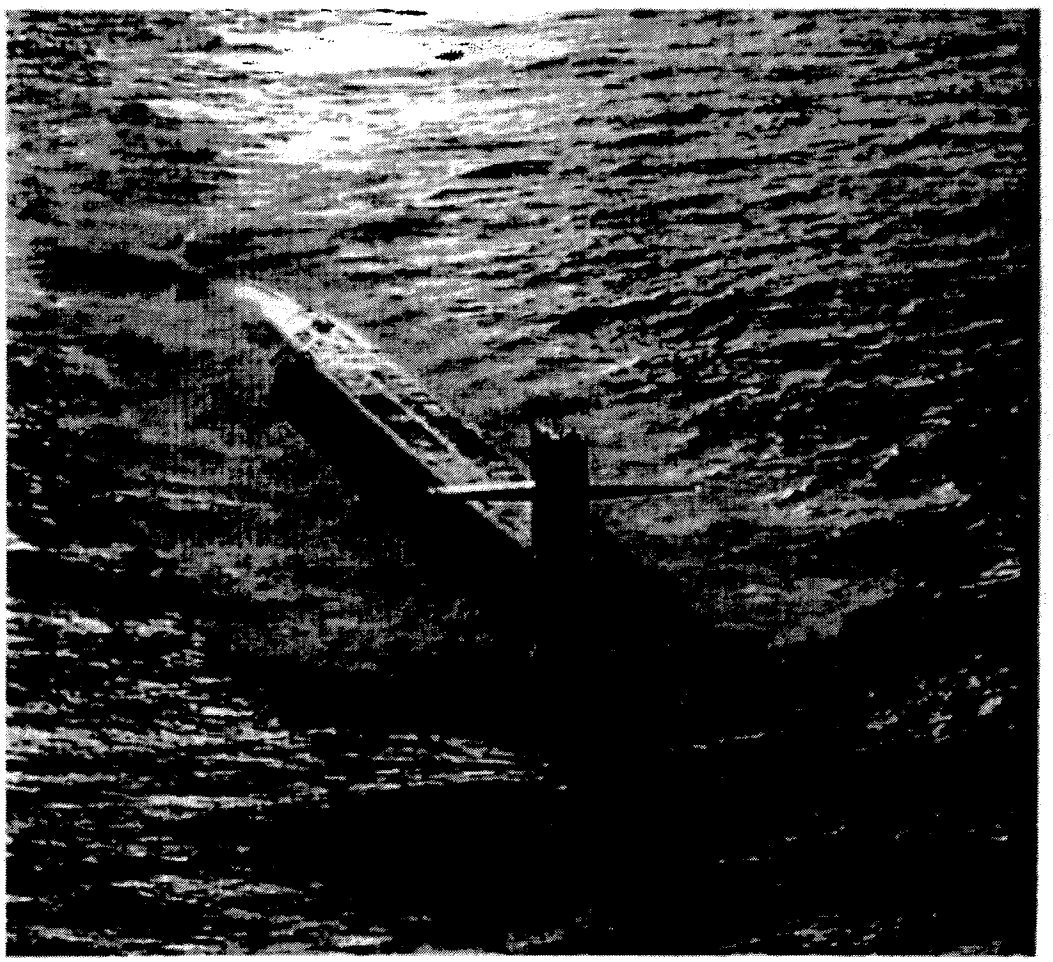


Diagram of a Typical Naval Nuclear Propulsion Plant

Inside the steam generators, the heat from the primary system is transferred across a water-tight boundary to the water in the secondary system, also a closed loop. The secondary water, which is at relatively low pressure, boils, creating steam. Isolation of the secondary system from the primary system prevents water in the two systems from intermixing, keeping radioactivity out of the secondary water.

In the secondary system, steam flows from the steam generators to drive the main propulsion turbines, which turn the ship's propeller and the turbine generators, which supply the ship with electricity. After passing through the turbines, the steam is condensed back into water, and feed pumps return it to the steam generators for reuse. Thus, the primary and secondary systems are separate, closed systems in which constantly circulating water transforms energy produced by the nuclear reaction into useful work.

There is no step in this process that requires the presence of air or oxygen. This, combined with the ship's capability to produce oxygen and purified water from seawater, enables the ship to operate completely independent of the earth's atmosphere for extended periods of time. In fact, the length of a submerged submarine patrol is limited primarily by the amount of food the ship can carry for the crew.



USS MAINE (SSBN 741) 50 Miles South of Naval Station Roosevelt Roads, Puerto Rico

COMMONLY MISSED INTERVIEW QUESTIONS

Interview preparations. We almost always have a representative at NR for interviews. I review all the comments from interviews and occasionally will feedback humorous/interesting comments your candidates receive. During these reviews I have found that there are a few questions that are routinely asked and if missed usually mean the candidate will fail. I cannot say getting these questions right will ensure a candidate will pass, but if they miss them they will in all likelihood fail. I will say these are home run type questions. Candidates should be able to answer these questions on their own with very little or no help. I have hesitated to provide these question in the past for fear that candidates will study these alone and not review properly for interview. We provide a raft of information on what to study and are always willing to provide any assistance you need. At any rate here they are;

a. Know the difference between an integral and a derivative and how to set up problems using them.

b. Be able to solve problems involving two equations and two unknowns. Typically a line and a parabola. (This will require recognizing a quadratic equation and using the quadratic formula.)

c. Recognize the equations for a line and a parabola, and be able to graph them without plugging in numbers to get points. Be able to solve for the area between the two curves.

d. Solve physics motion problems (i.e. position, velocity, acceleration, and time problems.) Usually a projectile motion problem.

e. Know how to use simple trigonometric functions (sine, cosine, tangent, etc.)

f. Know the difference between fission and fusion and that Naval Reactors use fission.

g. Know how to solve problems using the gas laws (i.e. What happens to pressure and/or volume as temperature changes and why.)

h. Know how to solve basic buoyancy and density problems.

i. Know Newton's laws.

j. For chemists, know what pH is, what a buffer is, the pH of a few acids and bases, and what the resultant pH is when two different pH solutions are mixed.

k. For engineers, know the laws of thermodynamics.

l. Know how to derive the equation for the area of a circle, and possibly a sphere.

m. Know and be able to use equations for potential energy, kinetic energy, centrifugal force, springs and friction.

I want to stress that these are not the only questions asked and these questions can be asked in many forms. However, missing these questions is a common thread in interview failures for both technical and non-technical majors. I also want you to understand that being an Engineering major does not mean that the student will do fine with the Calculus and Physics basics. They need to review these subjects just as much if not more than their degree knowledge. Most engineering majors forget the basics and look terrible in interviews when they can't explain what an integral is, but they use them all the time for certain things. If you have any questions about these please call to discuss.

Additional Areas to Study by Major

All Majors:

- Definitions of differentials, derivatives and integrals
- Integration by parts
- Classify DEQs (and solve 1^{st} and 2^{nd} order linears)
- Polar/cylindrical/spherical coordinates
- Derive areas of circle, triangle, sphere (surface)
- Derive volume of sphere
- Definition of pH
- Types of chemical bonds
- Pascal's Law
- Archimedes' principle
- Simple DC RC & RL circuits
- One of your old physics labs
- Definitions and units for enthalpy and entropy

Electrical Engineering:

- Control systems (Nyquist diagrams, etc.)
- Motor/generator theory
- LaPlace transform solutions to RLCs
- Digital logic
- AC/DC circuit analysis
- Transformer theory
- Electromagnetic induction
- Faraday's Law

Mechanical Engineering:

- Shear/moment diagrams for beams
- Stress/strain curves, typical values for Young's Modulus of steel
- Types of welds
- Annealing, tempering, forging, cold working
- Heat transfer around boundary layers and through different types of materials (qualitative)
- Basic heat transfer problems for heat exchangers (Q=UA T, Q=mc T_
- Tank draining problems (fluids with Bernoulli's)
- Hooke's law
- Laws of thermodynamics
- Moment of inertia
- Heat transfer equations (conduction, convection, and radiation)

Chemical Engineering:

- Concentration/dilution problems solved with DEQs
- Corrosion (how to minimize, what causes it)
- Buffers
- Types of bonds
- pH problems
- Equations for Gibbs Free Energy and Helmholtz Energy
- Catalysts
- Metals versus nonmetals

Aerospace Engineering:

- Resonant frequency
- Bernoulli's Equation/fluids/transport problems

Civil Engineering:

- Tank draining problems (fluids with Bernoulli's)

Chemistry:

- Types of bonds
- Buffers
- Crystal structures
- pH problems
- Catalysts
- Metals versus nonmetals

Computer:

- Boolean algebra
- Semi-conductor theory
- Probs and stats

Physics:

- Elastic/inelastic collisions
- Orbit problems
- Momentum problems

Math:

- Linear algebra
- Taylor and Fourier series
- Triple integrals
- Decay/buildup problems using a series of DEQs
- Spherical coordinates
- Derive quadratic equation

will be trying to imagine you on the bridge of a ship or sub. He asks most people "Why do you want to do this?" You should have an answer ready. If he doesn't ask you, tell him. Above all else, in all the interviews be completely honest.

I have a lot to learn in the Navy, and these are the kind of people I want to learn it from.

ADDITIONAL AREAS TO STUDY BY MAJOR
(if you've had the corresponding classes)

EVERYONE

-Definitions of differentials, derivatives and integrals
-Integration by parts
-Classify DEQs (and solve 1st and 2nd order linears)
-Polar/cylindrical/spherical coordinates
-Derive areas of circle, triangle, sphere (surface)
-Derive volume of sphere
-Definition of pH
-Types of chemical bonds
-Pascal's law
-Archimedes' principle
-Simple DC RC & RL circuits
-One of your old physics labs
-Definitions and units for enthalpy and entropy

EE

-Control systems (Nyquist diagrams, etc.)
-Motor/Generator theory
-LaPlace transform solutions to RLCs
-Digital logic
-AC/DC circuit analysis
-Transformer theory
-Electromagnetic induction
-Faraday's Law

ME

-Shear/moment diagrams for beams
-Stress/strain curves, typical values for Young's Modulus of steel
-Types of welds
-Annealing, tempering, forging, cold working
-Heat transfer around boundary layers and through different types of materials (qualitative)
-Basic heat transfer problems for heat exchangers ($Q=UA\,T$, $Q=mc\,T$)
-Tank draining problems (fluids with Bernoulli's)
-Hooke's law
-Laws of thermodynamics
-Moment of inertia
-Heat transfer equations (conduction, convection, and radiation)

IE

-Same materials problems as MEs above

CHE
-Concentration/dilution problems solved with DEQs
-Corrosion (how to minimize, what causes it)
-Buffers
-Types of bonds
-pH problems
-Equations for Gibbs Free Energy and Helmholtz Energy
-Catalysts
-Metals versus nonmetals

AE
-Resonant frequency
-Same materials problems as MEs above
-Bernoulli's Equation/fluids/transport problems

CE
-Same materials problems as MEs above
-Tank draining problems (fluids with Bernoulli's)

CHEMISTRY
-Types of bonds
-Buffers
-Crystal structures
-pH problems
-Catalysts
-Metals versus nonmetals

COMPUTER
-Boolean algebra
-Semi-conductor theory
-Probs and stats

PHYSICS
-Elastic/inelastic collisions
-Orbit problems
-Momentum problems

MATH
-Linear algebra
-Taylor and fourier series
-Triple integrals
-Decay/buildup problems using a series of DEQs
-Spherical coordinates
-Derive quadratic equation

All majors

EXAMPLES OF INTERVIEW QUESTIONS OF A PERSONAL NATURE

1. What do you like to do in your spare time?
2. Do you have any marriage plans?
3. Do you think your grades accurately reflect your knowledge in the subjects taken?
4. What is your biggest problem?
5. What do you see yourself doing in 20 years?
6. What accomplishments have made you proud?
7. If you could change your major, what would you have taken?
8. What books have you read in the past year?
9. What is the most outstanding thing you've ever done?
10. What is the toughest/easiest class you've taken?
11. What has been your biggest challenge to date?
12. How did your earlier interviews go?
13. * Why do you want to be a part of the nuclear propulsion program?
14. Why should you be selected for the program?
15. Why did you choose the school that you did?
16. Why did you choose the major that you did?
17. How much time per week did you study?
18. What were some of your high school activities?
19. What were some of your college activities?
20. Why did you receive such a low grade in this class?
21. Why did you receive such a low grade during this semester?

23. What has been some of your previous work experiences?
24. Do you want surface or subs? Why?

All majors

26. What assurance can you give that you will successfully complete nuclear power school (NPS)?

27. What are the hours of study required in your major as compared to the number required of a engineering (non-tech) major at your school?

28. Why were you so nervous in interviews?

29. How did you pay for college?

30. What did you do during the unaccounted-for time on your transcript?

31. To what other schools did you apply?

32. In what extracurricular activities did you participate?

33. Discuss any summer jobs and school projects?

34. Is your school accredited?

35. How did your school/dept. compare with others?

36. Why are you a technical major when you do so much better in non-technical subjects?

37. Are you fully aware of what you will undergo at NPS?

38. How were you informed about NPS?

39. Do you feel that your preparation was adequate enough to get you selected?

majors

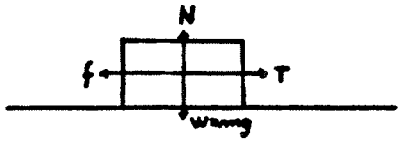
PHYSICS OVERVIEW

1. NEWTON'S FIRST LAW: A body will continue in its state of rest, or in uniform motion in a straight line, unless it is compelled to change that state by forces impressed on it.

   $\Sigma F_x=0$, $\Sigma F_y=0$ (first condition of equilibrium)

2. NEWTON'S SECOND LAW: The change of motion is proportional to the motive force impressed, and is made in the direction of the straight line in which that force is impressed.

   $\Sigma F_x=ma_x$, $\Sigma F_y=ma_y$

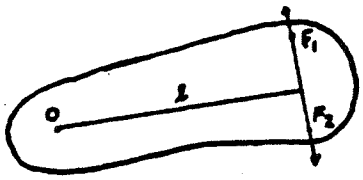


3. NEWTON'S THIRD LAW: To every action there is always opposed an equal reaction, or, the mutual actions of two bodies upon each other are always equal and directed to contrary parts.

4. FRICTION: Static Force $F_s \leq \mu_s N$, Kinetic force $F_k = \mu_k N$

5. MOMENT: The product of the magnitude of a force and its force arm.

   $\Sigma M=0$ (about any arbitrary axis)
   (second condition of equilibrium)



6. VELOCITY: $v=\lim_{\Delta t \to 0} \frac{\Delta x}{\Delta t} = \frac{dx}{dt}$

   The instantaneous velocity at any point of a coordinate-time graph equals the slope of the tangent to the graph at that point.

7. ACCELERATION: $a=\lim_{\Delta t} \frac{\Delta v}{\Delta t} = \frac{dv}{dt} = v\frac{dv}{dx}$