

# Holey Smoke!!

## (Case 1026)

The mission of the National Institute for Engineering Ethics (NIEE) is to promote ethics in engineering practice and education. One component of NIEE is the Applied Ethics in Professional Practice (AEPP) program, providing free engineering ethics cases for educational purposes. The following case may be reprinted if it is provided free of charge to the engineer or student. Written permission is required if the case is reprinted for resale. For more cases and other NIEE Products & Services, contact the National Institute for Engineering Ethics, Purdue University, [www.niee.org](http://www.niee.org). (All reprints must contain these statements)

### The Case:

Three years ago, Jack Florin was promoted to the position of chief geotechnical engineer of Welk Consultants, a geotechnical engineering consulting firm located in Fargo, North Dakota, after having been with the firm for more than 18 years. Welk Consultants is a full service firm in geotechnical engineering, maintaining several drilling rigs, experienced drilling crews and geologists, as well as a laboratory. The drilling and sampling operations are overseen by the firm's drilling manager, Ernest Downholt.

In his capacity as chief geotechnical engineer, Jack has written professional engineering reports that provide design parameters for the foundations of over a hundred structures, with projects ranging from small commercial buildings to large grain elevators. In the conduct of his work, Jack must rely on the data gathered by the firm's drilling and boring crews and geologists, often spread over a territory covering several hundred miles of eastern North Dakota. As a check, Jack occasionally visits the project sites while the drillers and geologist are at work, but because of an increased work load and other personnel management responsibilities, he is normally in the office writing reports and overseeing the work of a number of younger engineers.

Realizing that he has not been in the field much recently, Jack decides to visit the site of a large proposed three-story office building complex approximately 60 miles from the firm's office. With the boring logs of most of the 18 planned subsurface explorations provided by the firm's drill crew and geologist in hand, he discovers upon arrival at the site that the drill rig and crew have come and gone. Jack looks for signs of the borings on the site but can find none.

Jack contacts Ernest Downholt by cellular telephone and arranges to meet him the following morning at the site. When Ernest arrives in the morning he also searches in vain for evidence of the borings, and in desperation points to what are obviously prairie dog mounds, claiming they are the remains of the drilling operation.

The accuracy of the subsurface exploration logs and data given to him by the drill crew is critical to Jack's analyses and design recommendations. It is now Friday morning, and the foundation design recommendation report is due in the client's office by Thursday of the following week, six days from now.

What should he do?

### **Alternate Approaches and Survey Results for “Holey Smoke!!” (Case 1026)**

1. Jack should not be that concerned. The soil conditions in the area of the project are not that variable, so looking at boring logs from other sites in the area should suffice to provide enough subsurface data for design purposes, especially if he uses very conservative assumptions for design and construction. Nonetheless, he should talk to Ernest and tell him in no uncertain terms that this situation with the drillers and geologist is not to be allowed again. In this way, Jack can meet his report deadline with the client, and prevent similar occurrences in the future.  
**Percentage of votes agreeing: 1%**
2. Jack should call the geologist who was supposed to be on the site, give him a piece of his mind in no uncertain terms, and demand that they (the geologist and the drillers) prove that the borings were done at the proper site and that the boring logs submitted are actually based on soil samples recovered at the site boring locations. If the geologist and drillers cannot do that to Jack’s satisfaction within a day, Jack should fire the entire crew.  
**Percentage of votes agreeing: 4%**
3. Jack should fire Ernest Downholt, since it was Ernest’s responsibility to oversee the drilling operations and he apparently failed to do so, or was in cahoots with the drillers and geologist.  
**Percentage of votes agreeing: 1%**
4. Jack should have Ernest contact the geologist or head of the drilling team to meet him at the site the following day and point out the locations of the borings. It is possible that Jack and Ernest were at the wrong site; it is possible that the geologists and drillers drilled at the wrong site; it is possible that the geologists and drillers didn’t drill at all, but manufactured the boring logs based on their experience in the area. If it turns out that Jack and Ernest were at the correct site and the geologist cannot show them the boring locations, Jack should require lie detector tests for Ernest Downholt and the members of the drilling and boring crew.  
**Percentage of votes agreeing: 1%**
6. Be upfront with the client. Tell them what you have discovered (or think you may have discovered) and ask for additional time to complete the report. Your honesty will convince the client of your obligation to complete the job correctly.  
**Percentage of votes agreeing: 18%**
7. Reschedule duplicate drilling with another crew at the correct site for the next available time, call the client and tell them that the data collected was

inconclusive and additional boring and sampling is essential for an informed and reliable report.

Percentage of votes agreeing: 5%

8. Reschedule duplicate drilling with another crew at the correct site for the next available time, call the client and tell them that the drill crew was unavoidably detained and the report will be several days late. This is much better than not communicating with the client at all, and should not be a problem, since Jack has worked with the client many times in the past.  
Percentage of votes agreeing: 4%
9. Require the geologists and drillers to go back to the correct site immediately, work over the weekend and have the field boring layout plan, boring logs and soil samples back in the office for Jack to go over while they are still there on Monday morning.  
Percentage of votes agreeing: 10%
10. Require the geologists and drillers to go back to the correct site immediately, work over the weekend and have the field boring layout plan, boring logs and soil samples back in the office for Jack to go over while they are still there on Monday morning. He should also require that all of this work be done without pay to the geologist and drillers.  
Percentage of votes agreeing: 5%
11. Require the geologists and drillers to go back to the correct site immediately, work over the weekend and have the field boring layout plan, boring logs and soil samples back in the office for Jack to go over while they are still there on Monday morning. He should also require that all of this work be done without pay to the geologist and drillers, and they should also pay for the truck and car expenses involved in going back to the site, as well as for the motel and meal expenses for staying overnight in the area of the site to finish the work by Sunday evening.  
Percentage of votes agreeing: 1%
12. Require the geologists and drillers to go back to the correct site immediately, work over the weekend and have the field boring layout plan, boring logs and soil samples back in the office for Jack to go over while they are still there on Monday morning. He should also require that Ernest Downholt accompany the drilling crew and geologist and stay with them on the site until the work is completed.  
Percentage of votes agreeing: 21%
13. Require the geologists and drillers to go back to the correct site immediately, work over the weekend and have the field boring layout plan, boring logs and soil samples back in the office for Jack to go over while they are still there on Monday morning. He should also require that Ernest

Downholt accompany the drilling crew and geologist and stay with them on the site until the work is completed. In addition he should require that all of this work be done without pay to the geologist and drillers, and they should also pay for the truck and car expenses involved in going back to the site, as well as for the motel and meal expenses for staying overnight in the area of the site to finish the work by Sunday evening.

Percentage of votes agreeing: 11%

14. After obtaining the correct information for the site from the geologist and drillers, Jack should have Ernest Downholt fire the geologist and drillers, since they can never be trusted again and the legal liability implications to the firm are tremendous if design recommendations are based on erroneous or false information, which could cause damage to the finished project, or injury or death. He should also remind Ernest that it is his responsibility to oversee the field crews, and if this type of situation should ever arise in the future, Ernest will be out of a job and down the road in the blink of an eye.

Percentage of votes agreeing: 19%

### **Forum Comments from Respondents**

#### **Comments received primarily from students:**

1. Jack should immediately talk to the drilling crew and geologic group. They should show the exact locations of the boring holes and sufficient evidence (ed. note – of what?). If Jack believes the group (ed. note – just the geologic group? How about the drillers?) is just putting together information after this, he should bring in another group and contact his client and tell them what he believes may have happened. Jack should ask for an extension and make sure things are done right, by having Ernest call from on-sight throughout the weekend with no additional pay (ed. note – who to receive no additional pay?). After all, Ernest did not adequately do his job. In many companies he may be required to provide a urine analysis for his mishap.
2. Depending on the soil type, ground cover, etc., completed borings can be incredible easy to miss, especially if it has rained. Some borings produce hardly any cuttings. In his presumed anger, Jack must be careful not to accuse anyone of fraud, which is exactly what he would have to do in order to get the entire drill crew back out to work the weekend. Forcing them to pay fore their time would really be inviting trouble. A little detective work (separately interrogating the crew members, etc.) might uncover what really took place, but there's no time, so Jack is best off hiring a local subcontractor to do the drilling and informing the client that the report will be a little late.
3. Inform the client and proceed to get valid data as quickly as possible, at his firm's expense (ed. note – whose firm?). Inform any clients whose foundations were based on unreliable data and remedy the situation at his firm's expense (ed. note – multiple clients for the site in question? Previous

clients and previous sites? What type of remedy is contemplated?). Fire Ernest Downholt, the geologists and the drillers as untrustworthy. Inform appropriate regulatory authorities of the problem and corrective action (ed. note – which authorities?).

4. It's possible that Ernest didn't give the orders to do the job. In that case he should be fired and someone else should supervise the team to get the work done (ed. note – if this is true, why fire Ernest?). If it doesn't get done on time, then the client should be warned about the problem. If Ernest did give the orders but the team didn't do the job, then the team should get to work right away and in the meantime find out the reasons why the job wasn't done (ed. note – who to find out why the job wasn't done?). Ernest should be demoted and Jack (with a new supervisor) will take charge. The team may or not be fired [sic].

**Comments received from practicing engineers:**

5. If the drillers faked the borings, first find out why they felt they needed to cut corners. Was Ernie putting undue pressure on them to produce? If there is a company policy in place against faking data and it says one strike and you are out, consider sacking them on the spot. Nevertheless consider that word will get around pretty quickly and the drillers would need to move away to get a new job. This could be pretty rough on them. Consider rehabilitation. If there is no policy, Jack will have to provide a warning that if this sort of thing ever happens again, the drillers will be sacked.

Also, tell the client the truth and ask for sufficient time to do the holes. Preferably have the drill foreman go with Jack to a face to face meeting with the client to personally apologize. This sort of apology will help in the long run.

6. Obviously this is a situation that threatens the survival of the firm, so Jack must divorce himself from every other aspect of his work. He must communicate the seriousness of the problem first to Ernest Downholt, emphasizing that it may well cost both of them their jobs and careers if not properly handled (putting Ernest, as the drilling supervisor, in the position of choosing between his loyalty to his wife and children and his loyalty to a drilling crew which may have put him in this position). Then Jack must immediately inform the principals in the firm that something is seriously amiss and alert them to the gravity of the situation.

Next he must visit the firm's lab and examine the "drill samples" that the drillers brought in for examination and testing. There is no need to alert the lab technicians that there is something unusual about this request. He must also interview the geologist that laid out the borings in the field and who presumably was with the drillers in the course of their work, laying the same choice on this person as he did on Ernest.

Armed with this information, Jack should bring the drill crew and rig back to the project site the next morning, telling them there is a need to confirm something unusual that was found in one or two of the borings. He should

then have the crew set up adjacent to Bore Hole #9 and drill a duplicate boring while he and Ernest and the geologist stand there, watch and he personally collects the samples and records the blow counts. His notes should be recorded on a copy of the boring log originally submitted for Bore Hole #9 that he has on his clipboard. If, as suspected, there is a serious discrepancy between Bore Hole #9A and Bore Hole #9, he should move the crew to Bore Hole #145 and repeat the process. In the event of a duplication of the serious discrepancy, he should ask them for an explanation. He should interview the driller in his truck and Ernest should interview the helper in the other truck. He and Ernest should then compare notes. If the crew admits they rigged the job, they should be allowed to resign from the firm. If they persist in their dishonesty, Jack should fire them on the spot for incompetence, falsification of company records (the boring logs), and suspicion of timesheet fraud, collect the keys to their vehicles and the office, and let them walk home.

Jack should then pull in two other drill crews to the site, and have them finish the other 16 borings. These two crews should be offered overtime pay to start early, work late and finish the field portion of the job. Ernest, the drilling supervisor, should be delegated to stay at the site 16 hours a day until the field work is done (if he had been paying attention in the first place, this would never have happened). Everyone, including the geologist should be required to work overtime, nights and the weekend to finish the borings, lab testing and their portions of the report. After the report is finished, Jack should have a post-mortem with the principals in the firm (within an hour of sending the report out the door), then an all-hands meeting to clear the air. The job may be a dead loss financially, but the company would be preserved.

7. My initial response to this case is to scream. This type of thing happened to me with a traffic counting crew in an eastern US state many years ago. A field crew can become so knowledgeable of the patterns associated with traffic that they think they can make (dry lab) the data. With regard to the drilling crew in the case history, they thought it won't make any difference because the soil is good and probably just like it was at a nearby location. The soils map from the USGS shows that it is the same soil and layer structure as another job, so why not fake the soil borings and get another part time job. In my traffic counting incident, members of the traffic counting crew had other jobs during the day: bartenders and school bus drivers! This is frightening!
8. Ethically Jack should cause or encourage complete, clear, accurate, objective, truthful and timely communications between themselves and the client regarding the services sought and rendered. The same is true between the engineer and his employees. Complete communication means the engineer provides sufficient information so that the client is appraised of the costs, problems, hazards and opinions. Complete communication also requires sufficient information, facts, materials, etc. so the client will not be

reasonably led to a fallacious conclusion, can act in an informed manner and has knowledge of pertinent matters. Truthful communication means the engineer should provide a realistic and honest appraisal of the situation relying on a reasonable application of the engineer's knowledge, skill, experience and education founded upon information and evidence normally relied upon by similarly situated engineers. Accordingly, Jack must either gather the necessary data to complete the services by the agreed upon time or inform the client the time limit will not be met. Either a modification of the contract must be made or damages paid for the breach.

9. Jack Florin has no choice. He is ethically bound not to proceed with the report. He might also be in violation of the law and certainly the rules and regulations of the state engineering licensing board. He should discuss the situation with his supervisor. Assuming the superior shares Florin's concern, they should immediately conduct the borings, and endeavor to complete the report within the original schedule. If the assignment cannot be completed within the schedule, they should so inform the client, who hopefully, will grant a time extension. Regardless of whether the report can be submitted on schedule or the client does not grant a time extension, under no circumstances should the report be submitted without proper borings.

In the unlikely event the supervisor instructs Florin to prepare a report based on the original information submitted by the driller, Florin should refuse even if it jeopardizes his employment. If Welk Consultants submits a report (without Florin's involvement), Florin should report the fact to the proper authorities. Very likely Florin should also begin to seek new employment.

10. Jack calls his brother, Myron, who owns a drilling firm of his own and ask if he could do a "rush" job for him, noting that it would be a 24-hours-a-day assignment and that he needs 18 borings completed in the next 72 hours.

Myron says, "Shuur thing, but I need a helper."

Jack says, "That's OK. I have a fellow here at the site who has at least one day of vacation left and seeing that this is Friday, I'm sure he is available for the next 72 hours. Ernest is already here at the site and will have the holes staked out by the time you get here with the rig."

Jack goes back to the office, and advises Jimmy, the project engineer, of the situation and that he will need to really "crunch the analysis and report on Monday." Jimmy says, "That's OK, Jack. I have rounded up the lab data from several local projects on that side of the Red River and we've got a good handle on the consolidation characteristics of the soils in the area. If we have the logs of the on-site borings and the site topo mapping, we can pull the report together by Tuesday evening."

Jack calls Ernest on his cell phone and says, "Ernest, I think we are all set as long as you and Myron can get the logs to the office first thing Monday morning and that you have laid off your drill crew by 4:30 PM today. If you can't get this done, I'll recommend to Lawrence that he fire both you and

your drill crew on Monday morning. Please give me an update at 3:30 PM Sunday. I'll be watching the Vikings game."

11. Everyone needs to be in sync with where the site is. If the drill crew is fabricating information, this is criminal (fraud). Jack and Ernest should immediately call the geologist. They should explain that they wanted to see the site are trying to find the boring locations and ask for descriptions of where the borings were located. If they still can't find them, they should come back to the site with the geologist and have him show them the locations. They should also take a close look at the samples collected and see if the samples are consistent with the expected subsurface conditions in that area.

If the borings were completed, and simply completed on the wrong site, Jack should call the client immediately and explain the situation, and that he will do whatever he can to get the report done, but it might be a little late. If the borings were not completed, the geologist and drill crew should be placed on some kind of administrative leave until the company can determine the extent of the problem. Clearly the individuals involved should no longer be employed by the firm, but more importantly, how many past projects are affected? Should the firm "come clean" with all past clients that may have been cheated? Or, hope nobody ever finds out?

The company must come clean. They should send a letter to every client they feel could have been affected and explain what has happened, what actions they have taken, what they intend to do to make restitution, and, how they can assure that it will not happen again. They could argue that the design recommendations are probably suitable anyway; they could suggest a "forensic" investigation at their own expense to confirm the design recommendations were appropriate, or they could offer to reimburse all or part of the fees paid especially those associated with the drilling costs they didn't in fact incur).

Perhaps the "cleanest" solution at the outset is to conduct the forensic investigations at their own expense, and hope like hell the soils are OK. And they should pray they have understanding clients who won't hold it against them in the future!

Additionally, the employees at fault may be criminally liable. The firm should discuss the merits of suing them for damages, reimbursement of salary and expense not earned, etc., and see if there is anything at all they can reclaim from the disaster.

12. I had a similar situation happen to me when I worked as a not-yet-licensed (staff) geotechnical engineer. In that case, our own, in-house drill crew actually drilled the borings, but claimed they got poor (no) sample recovery in a marly limestone and thus took field penetration tests. But I learned that while it was true they got poor sample recovery, they did NOT take some of the penetration tests; they merely fabricated the penetration test data on the field logs. I would not have learned this had not one of our geologists visited the site unexpectedly and checked the boring logs (which showed a



penetration test had just been done) when in fact he knew this had not happened. The geologist reported this to me and I reported it to the licensed PE/office manager.

I was furious! I told the boss that my bearing capacity calculations and foundation recommendations were based on that data. I could not, in good conscious, write a report based on fabricated data. Although I did not attempt to tell my boss what to do, he clearly knew how displeased I was. Angry and frustrated as I was, I was inclined to fire the entire drill crew. At a minimum, I would have fired the driller.

My boss took a less strident position. Perhaps he felt he didn't have enough evidence to fire the driller. Also it so happened that we had a backlog of projects which had to be drilled, and being concerned not to create major delays for the rest of our clients, the boss took the following approach: He called the driller (not the crew) in to the office the next day (brief meeting at the end of the day – not a special inquisition) and in my presence told the driller in abstract terms that it was very important to obtain accurate boring data, and this included field penetration tests. He explained that the foundation design depended on the data but he did not mention any specific case of fabrication (such as the one the geologist came upon). The gist of the conversation was an unspoken but implied “don't let it happen again” or “don't let me catch you fabricating data.” As for me, after the driller left the boss told me that in the first place, I should realize that drill crews sometimes fabricate data and I should take all field penetration data with a grain of salt, and apply safety factors accordingly. He said that's just the way things are. He also told me to do the best I could with the analysis and he would look it all over, but that we would not re-drill the site.

I requested a transfer to another office shortly after that. At the new office we only used contract drillers and had a policy that one of our professionals (geologist or an engineer) must be on site with the drill crew to log all borings.