



COPY

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

MAY 5 2008

Programs and Project Management

Ms. Donna Katula
Environmental Manager
International Paper
Post Office Box 570
Savannah, Georgia 31402

Dear Ms. Katula:

The US Army Corps of Engineers, Savannah District (USACE), is studying the feasibility of deepening the Savannah Harbor's 42-foot deep authorized navigation channel to as deep as 48 feet below Mean Lower Low Water (mllw). Our research indicates that the International Paper pipeline at harbor station 89+250 will retain 8 feet of clearance on the northern side of the channel after the channel is deepened. This clearance is based on the difference between the elevation of the pipeline as provided by your staff, and the maximum dredging depth of 13 feet below the existing 42-foot project depth. The maximum dredging depth includes 6 feet of deepening, 2 feet of advanced maintenance, 2 feet of allowable overdepth, and 3 feet of dredging disturbance.

The USACE has sought to determine if an adequate factor of safety would exist over the pipeline during deepening and future maintenance dredging. Based on the clearance that would remain and given our current dredging practices, the USACE will not require the pipeline to be removed. However, there may be other factors unknown to the USACE which may present risks that International Paper cannot accept.

Unless I am informed otherwise by your engineering staff, the project planning will move forward with consideration given to the best method for dredging over your utility line without damaging it. The USACE will specify that its contractors stay within prescribed limits as determined by as-built drawings provided by International Paper. If you desire further information on the Savannah Harbor Expansion Project please contact, Alan Garrett, Project Manager, at 912-652-5172.

Sincerely,

Peter A. Oddi, P.E., PMP
Deputy District Engineer for
Programs and Project Management



DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

MAY 5 2008

Programs and Project Management

Mr. Javier Garcia
Southern Natural Gas
Encroachment Coordinator
569 Brookwood Village
Suite 501
Birmingham, Alabama 35209

Dear Mr. Garcia:

The US Army Corps of Engineers, Savannah District (USACE), is studying the feasibility of deepening the Savannah Harbor's 42-foot deep authorized navigation channel to as deep as 48 feet below Mean Lower Low Water (mllw). Our research indicates that the Southern Natural Gas pipeline at harbor station 51+500 will retain between 9.0 to 10.5 feet of vertical clearance between the maximum proposed channel disturbance depth and the top of the southernmost pipeline. This clearance figure is based on the difference between the elevation of the pipeline as provided by your staff, and the maximum dredging depth of 17 feet below the existing 42-foot project depth. The maximum dredging depth includes 6 feet of deepening, 6 feet of advanced maintenance, 2 feet of allowable overdepth, and 3 feet of dredging disturbance. I understand that a similar clearance limit is also anticipated for your northernmost pipeline as both lines were installed in the same trench.

The USACE has sought to determine if an adequate factor of safety would exist over the pipelines during deepening and future maintenance dredging. Based on the clearance that would remain and given our current dredging practices, the USACE will not require the pipelines to be removed. However, there may be other factors unknown to the USACE which may present risks that Savannah Natural Gas cannot accept.

Unless I am informed otherwise by your engineering staff, the project planning will move forward with consideration given to the best method for dredging over your utility lines without damaging them. The USACE will specify that its contractors stay within prescribed limits as determined by as-built drawings provided by Savannah Natural Gas. If you desire further information on the Savannah Harbor Expansion Project please contact, Alan Garrett, Project Manager, at 912-652-5172.

Sincerely

A handwritten signature in black ink, appearing to read "PO", with a horizontal line extending to the right.

Peter A. Oddi, P.E., PMP
Deputy District Engineer for
Programs and Project Management

A. Project Requirements

The Savannah Harbor Expansion Project is studying the feasibility of the deepening the Savannah Harbor navigation channel to as deep as -48 feet mllw. This maximum additional depth of 6 feet is accompanied by advance maintenance of up to 6 additional feet in areas of utility crossings. To avoid damaging any existing utilities which cross the navigation channel, it was necessary to determine a) the location, both horizontal and vertical, of the utilities and b) the amount of overburden required to provide an adequate factor of safety for the pipelines after deepening of the channel. Consideration was also given to future maintenance of the channel in the pipeline areas.

B1. Regulatory Agency Cover Requirements

Pipeline industry standards for clearance guidance stated that 4 feet of cover was required in areas of new pipeline placement (Pipeline and Hazardous Materials Safety Administration, DOT Rules and Regulations, section 192.327 Cover, paragraph (e)...**"all pipe installed in a navigable river, stream, or harbor must be installed with a minimum cover of 48 inches"**). The Engineering Research and Design Center (ERDC) Dredging Operations Technical Support (DOTS) program was also contacted to request the US Army Corps of Engineers (USACE) policy regarding dredging over pipelines. ERDC confirmed that no engineering design standard exists but it is noted that the Corps of Engineers Safety Manual (EM 385-1-1) stipulates that the the Corps identify the location of utility lines and analyze the potential for damage due to marine activities. Once completed, recommended steps to prevent interference or damage will be specified.

B2. Research

All available District permits applicable to river crossings in the project area were collected. The results of this effort are documented in Table 1 and Appendix A. This effort helped to determine which areas had potential conflict with the harbor deepening based on as-built drawings on file with regulatory permits. In addition, a response was solicited from industries and property owners adjacent to the navigation channel by public notice (see Appendix B_XX?) in April 2007, informing them of the USACE's intention to study the proposed deepening of the harbor and inquiring to gather information on any existing or proposed utility crossings. The results of the investigation are as follows:

a) It was determined that Georgia Power crossings are all overhead lines and the former "in-channel" crossings discovered by research of district permit applications no longer exist.

b) It was determined that all underground utility crossings to Hutchinson Island at approximate Stations 68+000, 72+000, and 78+000 would not conflict with the proposed

deepened channel based on drawings received from Hussey, Gay, Bell & DeYoung.(see Appendix). The depths of these lines were 31, 33, and 23 feet respectively below the proposed channel bottom alleviating any concern for their safety.

c) Areas of potential conflict after channel deepening were confined to the Southern Natural Gas (SNG) pipelines at Harbor Station 51+500 (4.5 feet of clearance based on 1977 as-built drawings) and the International Paper (IP) pipeline at Harbor Station 89+250(8 feet of clearance). (Note: the amount of clearance is based on the difference between the elevation of the pipeline and the maximum dredging depth of 15 feet below the existing 42 foot project depth which includes 6 feet of deepening, advance maintenance(varies from 2 feet to 8 feet based on reach of channel), 2 foot allowable overdepth, and 3 foot dredging disturbance.(DOTS study – Appendix C)

The USACE met with local officials from SNG to present its concerns. The SNG representatives subsequently forwarded USACE provided drawings (Figure 1 and 2)of the area of concern to their parent company (Texas El Paso) in Birmingham, Alabama. SNG stated that they normally require at least 5 feet of cover over their pipelines. The issue was discussed with Mr. Lynn Roberts who is now the point of contact concerning their pipeline. He stated their intention to “pig” their two pipelines in late October. The “pig” is a remote controlled electronic inspection device for the pipeline which can also provide accuracy to within 1 meter of the location of the pipeline. Mr. Roberts stated in follow-up conversation in Oct 07 that he hoped to have accuracy within 1 foot with the hydrographic survey to be done in Oct 07 and “pigging” in December 2007.

In February 2008, the USACE received final results from SNG of the survey of their pipeline crossing done by T. Baker Smith in October 2007. After correspondence with T. Baker Smith in which accurate proposed channel location coordinates were provided and the difference in vertical datum was resolved, it was determined that there is between 9 to 10.5 feet of clearance between the maximum proposed disturbed channel depth and the top of the southernmost pipeline (Figure 3). The northernmost pipeline is scheduled to “pigged” in June to July 2008. Similar results are anticipated as both lines were installed in the same trench.

The USACE also contacted International Paper’s (IP) point of contact to advise them of plans for deepening the harbor. IP provided an electronic file showing a cross section of their pipeline. The USACE provided the design template for the deepened channel including disturbance depth on the cross section (Figures 4 and 5). To date, there has not been a follow-up response. Preliminary indications are that the IP pipeline will retain 8 feet of cover in addition to 3 feet allowed for dredging disturbance on the Northern side of the channel after Deepening.

C. Dredging Methodologies in Areas of Pipeline Crossing

When contacted about a USACE standard for dredging offsets over pipelines, ERDC suggested contacting the district offices in New Orleans and Mobile to inquire of their standards. It was also suggested that the Savannah District solicit industry’s input to determine their level of accuracy in dredging over pipelines. Industry input is summarized in the following paragraph.

Industry input

Conversation with Graham Payne/Norfolk Dredging revealed that his company routinely dredges within a 3-4 feet horizontal distance away from pipelines in Philadelphia District (Schuylkill River – 400 foot wide cut). The pipeline locations are well documented and the dredging firm takes precautions, (i.e., swing slow, cut off cutter-head over line, etc.) The dredge operator can tell when he is dredging over previously dredged material. This issue was also discussed with Armond Riehl/Great Lakes Dredge and Dock, Inc.. He stated that from his experience, the dredge can remove material within 5 foot vertical distance of a pipeline based on the distance between the overdepth prism and top of pipe. He also stated that if the dredge operator was not absolutely sure of the pipeline location he could also use the mechanical dredge to come within 25 feet of either side of the pipeline to remove material and recommended using suction without the cutterhead turning if material is soft over the pipeline

New Orleans District Input

Armond Riehl also referred to Bobby Guichet, of the New Orleans District who has a great deal of experience in dredging over pipelines having administered over a hundred contracts dealing with this issue in Mobile, Galveston, New Orleans, Vicksburg, and Philadelphia. He provided specifications listing necessary precautions involving dredging over pipelines and stressed the need to insure correct calibration of cutterhead positioning. He did express concern that we have to deal with greater tidal exchange than what he normally deals with on the Gulf coast. This fact complicates tidal height calculations in Savannah Harbor. Mr. Rick Broussard in the New Orleans district office was also contacted and from his experience in dredging over pipelines, dredging is usually limited to 10 feet below project grade or 8 feet below required depth with 2 feet for advance maintenance and allowing 1 foot for overdepth.

This equates to a 7 foot dredging tolerance over pipelines. He agreed with the tolerance of 8 feet being used for Savannah which includes 3 feet of dredging disturbance as part of the tolerance.

Savannah District Input

Engineering Division initially recommended dredging up to but not over the SNG pipeline and allowing river currents to remove remaining new work dredged materials. The same practice would apply to O&M dredging operations. This recommendation has been revised. Velocities were examined in vicinity of the SNG pipelines to determine if this approach was feasible as this is the current practice adjacent to Old Fort Jackson. Even though current velocities in the Old Fort Jackson reach are influenced by ebb tides coming out of the Back River, the current velocities near the SNG facility are similar.

Detailed investigations determined the velocities to be comparable in front of Old Fort Jackson (maximum bottom 1.4 – 1.8 fps, maximum surface 3.7 – 4.2 fps) and over the SLNG pipeline (maximum bottom 1.4 – 1.8 fps, maximum surface 3.7 – 4.5 fps). Maximum velocities over the International Paper pipeline were somewhat smaller (maximum bottom 1.6 fps, maximum surface 3.4 fps). These measurements suggested that it may be possible to provide adequate

depth over the SNG pipeline by dredging on either side of the pipeline and allowing the currents remove maintenance material similar to how the area in front of Old Fort Jackson is maintained.

However, additional research revealed that although the reach in front of Old Fort Jackson is not currently dredged as part of the maintenance contract, it was initially deepened to 44 feet by a cutterhead dredge. Dredge scars in the Miocene layer of clay are still visible in the Miocene material in photos taken by side scan sonar. Since these cuts are still evident and have not been "smoothed out" by currents, it is unwise to assume that currents are swift enough to remove deepening, new work materials. The clays of the Miocene layer are too stiff to be removed by anything other than mechanical equipment. The clays reside at elevation -45 feet to -47 feet MLLW in front of Old Fort Jackson and from -43 feet to -46 feet MLLW in the SNG pipeline area, and around -44 feet MLLW at the International Paper pipeline.

D. Risk Analysis/Areas of Concern

The USACE has sought to determine if an adequate factor of safety would exist over the pipelines after deepening in regard to dredging. Based on the factors used to determine the amount of clearance that would remain after deepening and current dredging practices in place, the USACE would recommend moving forward with the project without requiring the pipelines to be removed. However, other factors may still present a level of risk that industries may not be willing to accept. Risks that may be greater due to a reduction in the amount of overburden over the pipeline include:

- a) Ships that lose steering capability in the navigation channel must drop and/or drag their anchor in the navigation channel to maintain position. The amount of remaining cover over the pipelines may or may not be adequate to prevent possible damage should this occur in their vicinity.
- b) Although the USACE has confidence in industry recommendations as to the accuracy of the position of the dredge cutterhead in the dredging process, dredges work in a dynamic environment subject to waves and currents, which can result in dredge position errors. The exact locations of the pipelines is essential (both in the horizontal and vertical axes). Without this knowledge, there is a chance that the dredge could be out of position and spud down on top of the pipeline. (Spuds are 20 ton cylindrical tubes used as pivot points for dredge movement).
- c) Some question still remains as to the buoyancy of the IP pipeline and whether or not the pipeline would have a tendency to float as the amount of overburden is decreased. SNG has confirmed that their pipeline would not be impacted by a change in the amount of overburden as the original pipeline installation called for external concrete coating in a thickness and weight to bring the pipe to a negative buoyancy.

E. Mitigation During Construction

Based on the proximity to the pipelines, the USACE would specify the following constraints during construction dredging:

- a) Signs and ranges would indicate “no dredge” areas in the field and would be indicated on the drawings as well during construction and operations and maintenance (O&M) dredging
- b) SNG would be contacted in advance of dredging and advised to shut off flow of gas into pipeline and IP would also be notified of channel dredging activities.
- c) Cutterhead turning would be suspended within 25 feet of the pipelines and an attempt would be made to remove material using only suction from the dredge pump. If material is too difficult to remove over pipeline, the contractor may be required to incorporate clamshell operations to more safely remove material.

F. Conclusion/Recommendation

The process of dredging in the SNG and IP pipeline areas will follow the accepted practice of approaching utility crossings from both upstream and downstream without “spudding” or dredging directly over the pipelines. The Savannah District will specify strict adherence to these procedures and will specify that its contractors stay within prescribed limits as determined by as-built drawings provided by utility owners.

Engineering Division recommends adopting the current dredging policy in areas of concern by;

- 1) Not “spudding” over the pipelines but allowing dredging over and within the vertical limits established by construction (5 feet for gas pipeline).
- 2) Limiting the amount of advance maintenance in the affected areas to provide necessary clearance if the pipeline location falls within 5 feet of required clearance and use precautions listed above.
- 3) If new work material is unable to be removed by suction without turning the cutterhead, the contractor may have to employ mechanical dredge to initially remove material.

Attachments:

Table of permit actions (Table 1)
Correspondence related to pipeline research (Appendix A)
Public notices, certified letter w/ dates, etc. (Appendix B)
DOTS document on dredging disturbance (Appendix C)
Plan view and cross section of LNG pipeline area (Figures 1-3)

Plan view and cross section of IP pipeline area (Figures 4-5)