

FINAL REPORT



AN ASSESSMENT OF OIL/ GAS WELLS ABANDONED/ PLUGGED BETWEEN 1943-1974 WITHIN THE STATE OF FLORIDA PHASE II - FIELD RECONNAISSANCE OF SELECTED WELL SITES (DNR-C-7683)

Prepared For:
Florida Department of Natural
Resources
Florida Geological Survey
Oil and Gas Section
903 W. Tennessee Street
Tallahassee, Florida 32304-7700

November 1993

Woodward-Clyde



Woodward-Clyde Consultants
3676 Hartsfield Road
Tallahassee, Florida 32303

Woodward-Clyde Consultants



Engineering & sciences applied to the earth & its environment

May 3, 1993

Dr. Walter Schmidt, P.G.
Florida Geological Survey
903 W. Tennessee Street
Tallahassee, Florida 32304-7700

RE: DNR-C-7683
Abandoned Oil/Gas Well Assessment
Final Report

Dear Walt:

Woodward-Clyde is pleased to present the final report for the abandoned oil/gas well assessment. Enclosed are three copies of the final report (2 volumes) which present the results and well data for the assessment of oil/gas wells abandoned between 1943 and 1974.

I will submit copies of the report for each Advisory Committee member. These can be sent prior to the May 25th meeting or presented at the meeting. Please let me know your preference. The copies for the legislative aides will be prepared for delivery following the Advisory Committee meeting. It is assumed that 30 additional copies will be required. Please confirm the number of copies required.

Following acceptance of this report, please notify your accounting section that the contract has been satisfied and that the \$10,000 retainer can be released. Also, please forward to me a statement of contractual completion and satisfaction.

This has been a very interesting project and it has been a pleasure working with you and your staff. We look forward to working with you on other projects in the future.

I am currently preparing a proposal for Phase II of the abandoned oil/gas well assessment which will be presented at the Advisory Committee meeting. I will submit this proposal to you prior to the meeting.

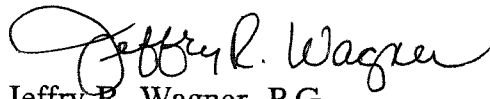


**Woodward-Clyde
Consultants**

Dr. Walter Schmidt, P.G.
May 3, 1993
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If you have any questions regarding this project, please call.

Sincerely,

A handwritten signature in cursive script, reading "Jeffry R. Wagner".

Jeffry R. Wagner, P.G.
Project Manager

JRW/bmg

Enclosures



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Project No.: 93F476C

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INTRODUCTION

1.1 BACKGROUND

In 1991, the Florida Legislature enacted a bill (Chapter 91-144, Laws of Florida) authorizing the former Florida Department of Natural Resources (FDNR)¹ to develop and implement a program to assess the abandonment and plugging procedures for permitted wells abandoned before 1974. As part of this assessment, environmental risks to Florida's fresh ground water system were to be identified and actions recommended to follow after the Phase II Assessment.

Phase I of the assessment was conducted by Woodward-Clyde Consultants and was concluded in May 1993 (Final Report, Volumes 1 - 3, An Assessment of Oil/Gas Wells Abandoned Between 1943-1974 within the State of Florida (DNR-C-7683)). The report presented the assessment of 448 permits for wells abandoned during the study period. Report conclusions were based on the results of correlating the hydrogeologic framework and aquifer properties with well construction features such as total depth, casing string depths, annular cement interval, open hole intervals, the presence or absence of plugs and plug placements. The relationship between the hydrogeologic and construction/plugging information provided an assessment for each well and identified the potential for migration pathways which might allow saline water to move into overlying freshwater aquifers.

The Phase I potential pathways assessment resulted in the identification of a group of wells referred to as Target Wells. Specific information about the Target Wells can be found in the Phase I Appendices. The list of Target Wells was compiled based on review of permit file records and published hydrogeologic information. Results of the evaluation indicated pathways for saltwater migration may exist for the Target Wells due

¹ Effective July 1, 1993 the Florida Department of Natural Resources merged with the Florida Department of Environmental Regulation to become the Florida Department of Environmental Protection.

to construction and/or abandonment deficiencies. The presence of a well on this Target Well listing does not necessarily indicate the existence of a problem, since there are numerous other factors which could alter migration pathways. Because of the uncertainty of pathways actually existing, the Phase I Target Wells were recommended for site-specific reconnaissance to determine if there was any visual basis or indirect evidence for concern. This follow-up work became Phase II of the assessment and was authorized by FDNR on June 28, 1993. As in the first phase, the work was conducted by Woodward-Clyde Consultants.

1.2 TARGET WELL REVISIONS

Following a review of the Phase I Final Report by FDNR, (memo from R.S. Caughey to W. Schmidt dated June 4, 1993, included as Appendix A), a meeting was held on June 17, 1993 to discuss possible revisions to the Target Well List. The following resulted from the meeting:

- Remove six wells from the Target Well Listing

Bay 6: Additional information and further interpretation of data indicated that this well appears to be adequately plugged.

Collier 319: Site visit by Collier Resources Company and FDNR provided information that South Florida Water Management District (SFWMD) had plugged the well.

Franklin 32: Additional information and further interpretation of data indicated that the well appears to be adequately plugged.

Hendry 414: Additional information provided; well appears to be adequately plugged.

Hendry 567: Additional information provided; well appears to be adequately plugged.

Walton 65: Further interpretation of data; well appears to be adequately plugged.

- Add 20 Wells to the Target List

Although the Phase I permit review indicated no potential for migration of highly mineralized water for 20 sites, FDNR was concerned that due to the plugging method, many of the plugs had slipped into the open borehole and the wells were not adequately plugged. Because of these concerns, these 20 wells were added to the Phase II Target Well List for additional information collection.

- Prepermit Wells

Two wells Gulf B-4 and Highlands B-1, were listed on the Target Well Summary in the Phase II proposal. Gulf B-4 was part of the original Target Well List of Phase I and Highlands B-1 was recommended for addition by FDNR following the June 17 meeting. Since these wells represent prepermitting, they should be assessed separately to reflect the different standards which existed when these wells were constructed. No further action was taken during Phase II for these two sites.

Prior to initiating Phase II, oil/gas industry representatives were asked for further information which would supplement permit file data and possibly eliminate an identified potential for the Target Well group. Collier Resources Company conducted site visits to 12 sites and Exxon furnished additional plugging information on Collier 64 which indicated that the annular cement and plugging were adequate. Collier 64 was also included in the 12 site visits completed by Collier Resources Company. Since the data collected during the site visits accomplished the scope of work for Phase II, no further action was taken on these wells during Phase II.

1.3 PHASE II PURPOSE AND SCOPE

The purpose of conducting the Phase II assessment was to acquire site-specific information to evaluate whether a wellhead exists at each Target Well site and if any indication of environmental impact could be confirmed by site inspections and interviews with property owners or others knowledgeable about the well. Following the compilation of the information gathered for each Target Well, a recommended action was presented for each well. These results are presented in this report.

The scope of work addressed by the Phase II Assessment included:

- Compiling permit file location information for each of the Target Wells which was not eliminated from further evaluation.
- Compiling site location information from the most recent available Florida Department of Transportation aerial photography.
- Identifying and interviewing (where possible) property owners or others knowledgeable about the site.
- Conducting site visits for a minimum of 20 sites (other site visits to be conducted by FDNR staff and industry representatives when possible).
- Evaluating results from site visits, interviews, and other related data and providing a recommended action item for each site.
- Compiling results of the Phase II assessment in a final report.
- Providing a glossary to supplement the Phase I report.

ASSESSMENT APPROACH

The approach to this Phase II assessment required locating each well site based on location information compiled from the FDNR Oil and Gas Section permit files and translating this location to current maps and aerial photography. Once the location was established, property ownership information was acquired. Property owners were interviewed concerning their knowledge about the well, other wells in the area, and conditions of site. When possible, previous owners, owners' neighbors, employees, or others with knowledge of the wells were also interviewed. Additionally, permission to gain access to property was requested. Based on the above information, arrangements were made to visit selected sites. The site visit consisted of updating map information, noting nearby water supply wells, describing land use, and searching for evidence of the well site. Where possible, water samples were collected so that the specific conductivity of the well/wellbore water could be measured. These values provided an indication of the mineralization of the ground water. Visual impacts to the property vicinity were noted for each site visited and photographs were taken when useful.

**3.0
FINDINGS**

Since the contractual agreement for Phase II did not include visiting all of the identified wells which comprised the Target Well Listing, FDNR and oil\gas industry representatives were asked to provide additional information for selected wells, including site visits when possible. Consequently, 15 sites were visited or additional information was supplied by FDNR; 12 sites were visited by Collier Resources Company; and a total of 30 sites were visited by Woodward-Clyde personnel.

The site-specific information compiled for each permit compiled during Phase II is included in Appendix B. Appendix B is a single copy, stand-alone document consisting of four 3-ring binders. The intent of Appendix B is to provide information that may be added to the Oil and Gas Section permitting files. Appendix B presents maps, aerial photography, ownership data, telephone interview records, site visit notes, photographs, and other pertinent site-specific information.

It should be emphasized that Phase II focused on visual information about the site and indirect information such as increases in chloride concentration for a nearby well which may suggest a problem. The field reconnaissance was not intended to identify specific problems that may be existing in subsurface. Therefore, where no evidence of a problem is stated for a site, the evidence referred to is visual surface features or indirect information from nearby wells.

3.1 SUMMARY OF FINDINGS

Table 1 lists all the wells both from original Target Well Listings and revisions as of the June 17, 1993 meeting. A summary of the field reconnaissance, remarks, and recommended action is provided in Table 1. A summary of this table, as well as additional information from the field reconnaissance, is provided below.

- Total of 71 sites were listed as Target Wells

- With three exceptions, no information, including site visits and interviews, was gathered which pointed to a problem requiring immediate attention. Exceptions are Charlotte 310, Levy 110, and Levy 199. Other sites where potential problems remain are Levy 13 and Levy 21, and Hendry 163.
- Ten wells were listed for removal from the Target Well List based on additional information and/or further interpretation of file data
- Two wells preceded the permitting period outlined in the Phase I assessment. These wells were not included in the Phase II work, since standards for these wells differ substantially from the permitted wells assessed.
- Forty-Eight wells were found not to have any evidence of a problem based on site visit and/or interviews. While the immediate site area was found for most sites, nine sites were considered vicinity searches and the actual site location was not accessible. Also four sites were determined not to have any evidence of the well site based solely on interview with the property owners.
- Four sites remain where no visit was conducted and no information was available from the property owners on the status of the well site
- One well was suspected to have leakage originating from a subsurface borehole
- Four wells were found with wellheads intact above ground level. In each case, no leakage was detected from these artesian wells.
- Ten sites had only the pads remaining as evidence of the well site

- Specific Conductivity values for wells where a sample could be collected are:

(μ mhos/cm)

Levy 21	881	
Levy 110	894	
Charlotte 310	3,400	(probably diluted by surface water due to heavy rainfall conditions; sample collected from surface water ponded in an area where the old well site is suspected to be located)

- Charlotte 310 located in Webb Wildlife Management area is about 2 miles from the nearest domestic well and more than 10 miles from the nearest public supply well. The property on which the site is located is currently owned by the State of Florida, Game and Freshwater Fish Commission. The Commission has been in contact with the SFWMD and the well is listed on the District's inventory as a leaking artesian well. Discharge from this well impacts the surficial aquifer, since the discharge contains higher mineralization (as implied from specific conductivity value) than normally found for water in the surficial aquifer.
- Both Levy 110 and Levy 199 are artesian wells. Due to the corroded nature of both casings, the exposure to acidic surface waters, and poor conditions of the cement slab for Levy 110, there is potential for leakage to occur. Each well is in a wetland area and due to rainfall at the time of inspection, runoff was flowing through each well site, making it impossible to determine if leakage from casing was occurring. Levy 110 was sampled for specific conductivity and showed relatively low mineralization, with a value of 894 μ mhos/cm. No water sample was collected at Levy 199 because the wellhead design is such that flow is controlled, but no sample outlet is provided.
- An artesian well (probably G-223) located about 500 feet from the Dade 167 well site has a flow estimated at 10-15 gallons per minute (gpm). Chlorides were reported by Caughey (October 19, 1993) at 80 parts per million (ppm). The total depth of the G-223 well is 600 ft, with 546 feet of 6-inch casing. Samples

collected from this well by the U.S. Geological Survey show chlorides concentrations ranging from 30-100 ppm (1942 and 1975). Using the G-223 well as an indicator of the ground water quality within at least 500 ft of Dade 167, it appears that no increase in mineralization is occurring.

- Levy 13 and Levy 21 appear to be in relatively good condition at the surface. The area around the wellhead is dry. Both are artesian wells and have flow control fittings. Levy 21 has a gate valve suitable for sampling. The Levy 13 wellhead is not designed so that a sample can be obtained. Recent specific conductivity readings from Levy 21 indicate that mineralization of the ground water is relatively low, with a value of 881 $\mu\text{mhos/cm}$. There is no indication of highly mineralized water within the borehole of Levy 21.
- Wells which were listed on the Phase I Target Well Listing because of comments in the permit file which indicated flowing well or leaking saline water were visited during this assessment. Charlotte 178, Collier 319, Hernando 378, Lee 208, and Levy 69 were reported as flowing or leaking. Subsequent site visits for these sites found that there was no visible evidence of leakage nor any evidence of the wellhead at each site.

Charlotte 178 was reported by the Southwest Florida Water Management District (SWFWMD) as the Cattledock Point well and it was indicated that the well was flowing. The location of Charlotte 178 was found during a site visit not to correspond with the Cattledock well. No signs of the 178 well or pad were visible at the site. It was also determined that this same site had been used as a county landfill for about 10 years (1960-1970). Apparently, the Cattledock well is an old agricultural well approximately 4 miles north of well 178 on the edge of Charlotte Harbor.

Collier 319 was visited by both Collier Resources Company and FDNR and no evidence of the well was found. Additional information provided by FDNR indicates that the well was plugged by SFWMD.

A visit to the Hernando 378 site showed no signs of the well. It was originally reported as flowing. The property owner has no knowledge of any flowing wells on the property.

A site visit to Lee 208 found no evidence of a well. In a letter (July 12, 1972) to FDNR it was reported that the well was found leaking highly saline water (9,600 mg/L, chloride). A FDNR memo dated August 30, 1972 indicated that proceedings to replug the well had been started. On December 17, 1980, R.S. Caughey (FDNR) visited the site and found no evidence of the oil test well or a water well which was reported also on-site. The site lies between a stripmall parking lot to the west and an apartment complex to the east. According to the distances listed on the well site survey, it is now covered by a building owned by Gold's Gym. No evidence of the well site was found during the Phase II visit.

The Levy 69 site visit provided no evidence of the well. This well had been reported as flowing in permit file documentation. A broken concrete pad was found, but no evidence of the wellhead was detected. It was not concluded that the concrete pad was the actual site location.

RECOMMENDATIONS

The recommended actions are divided into four groups:

1. Immediate Attention Remediation
2. Possible Remediation
3. Site Visits
4. Database Management

Each of these groups are summarized below. Table 1 lists site-specific recommended actions for each Target Well.

1. Immediate Attention Remediation

The Charlotte 310 site was found to have subsurface leakage of ground water, probably originating from the borehole. Since at the time of the site visit heavy rains caused flooding of the area, the exact position of the borehole was not located and the bubbling of subsurface waters was not visible. It is recommended that the site be visited during dry weather conditions and a recommendation of remediation actions be made at that time.

South Florida Water Management District should be contacted and a firm determination should be made of their plans for this site. It is recommended that at minimum the free flow of ground water be stopped and controlled. As funding becomes available within existing plugging and abandonment programs, it is recommended that this site receive high priority for plugging and that the well be properly plugged and abandoned.

2. Possible Remediation

Although no immediate attention is required for those sites where the wellhead was found to exist, it is recommended that permits 13, 21, 110, and 199 (all in

Levy County) become candidates for plugging and abandonment. These artesian wells are not in use, and due to their age it is unlikely that these wells will ever be used. However, since the property owners have taken over maintenance responsibilities for these wells, they may have intentions of using them.

Two wells, 110 and 199, should be visited during dry weather conditions to determine if leakage is occurring. If leakage is occurring, the priority for plugging and abandonment should be increased. Because of the current extent of casing corrosion, it is recommended that these wells be periodically inspected to determine if leakage is occurring until funding is available for proper plugging and abandonment. These wells are on the Suwannee River Water Management District (SRWMD) inventory of artesian abandoned wells. SRWMD has no funding at this time to properly plug and abandon these wells. If no beneficial use is determined and the wells remain unused, it is suggested that the SRWMD request that the wells be plugged through existing plugging programs.

3. Site Visits and Condition Status

Since no site inspection or contact with owners was made for four sites, it is recommended that these sites have a follow-up visit to determine the site status. These sites are:

Collier 92
Collier 98
Osceola 8
Putnum 96

4. Tracking through Database Management

It is recommended that the Department's Oil and Gas Section data management system be modified to add specific information for all wells remaining on the Target Well List. The revised Target List would include all but the 12 wells recommended for removal from the listing.

The purpose of this Target Well database is to make information accessible to other environmental entities. Just as monitoring wells or municipal supply wells are part of an informational database, so should be the oil and gas wells. An accessible database for oil and gas wells will allow tracking of this type of information as well as other information which has the potential to impact the environment. This system could be used to readily eliminate an oil/gas well as the possible source for impact. It likewise could identify oil/gas sites, as well as other potential sources, that could be investigated. Many of the water managers in Florida are unaware of the existence of the oil/gas well permit files. Communication and establishment of an accessible database for oil and gas wells would allow this data to be merged with other resources data. Readily accessible data would reduce some of the misconceptions about the environmental risk of oil and gas wells. Through the programs of the Florida Department of Environmental Protection, the five state water management districts, and various local environmental programs, a vast computerized information system is being developed. If in the future an oil/gas well becomes the cause of environmental impact, communications between all agencies will be necessary to minimize the impact.

It is not economically feasible (estimated costs range from \$10,000 to greater than \$400,000) to re-enter, plug, and abandon a well based solely on deficiencies in the permit file documentation. There needs to be some tangible evidence of a problem which can be attributed to an oil/gas well before re-entry into an old abandoned well should be attempted. Effective oil/gas well database management will allow tracking of potential problems and will provide effective communication between environmental entities. As problems or potential problems related to oil/gas wells are discovered, they should be documented in the database. Wells which precede permitting could also be included in a modified form of the existing database.

TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Bay	6	1/9/46	Unknown	Timberland	No	No	Unknown	Further interpretation indicates well adequately plugged (June 27, 1993 meeting).	Remove from Target Well Listing
Charlotte	178	3/14/54	Cape Cave Corporation Rotunda Development	Undeveloped wetland - former landfill	Yes	Yes (1) 9/23/93	Access Road Only	In Phase I Assessment well reported as Cattlecock Point flowing well. This is not the Cattlecock well.	Reason well was on original Target Well List was that it was reported flowing. Since this is not the flowing well and there is no evidence of problem, recommend removal from Target Well List.
Charlotte	310	1/2/64	Florida Game and Freshwater Fish Commission (FGFWFC)	Wetland; Wildlife Management Area.	Yes	Yes (1) 9/23/93	Yes	Although wellhead not visible, water flowing up to surface from subsurface; flow has created small pond. Water samples collected; specific conductivity of water = 3400 umhos/cm. Sample probably diluted due to heavy rainfall and flow from other ponds to wellhead area. FGFWFC staff indicated that SFWMD is aware of well and that funding was not available to plug well. SFWMD anticipated that this will be a very costly well to plug and abandon.	Visit during dry period to determine exact location of wellbore. Collect representative water sample near wellbore. Recommend control free flow of ground water and property plug and abandon well.
Collier	17	11/5/46	Florida Favorite Fruit Corp.	Citrus Grove	Yes	Yes (3) 6/10/93	Pad Only	No evidence of problems following visit; no evidence of problems in nearby wells.	Add well to oil/gas database

• Site visited by:
1 = Woodward-Clyde
2 = FDNR
3 = Collier Resources Co.

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Collier	23	10/22/45	Richard Johnson	Homesite and unimproved pasture	Yes	Yes (3) 6/9/93	Pad Only	No recorded surface plug in file records. No evidence of water seepage from subsurface through limestone pad. It would appear that deeper plugs are preventing upward flow or well has surface plug.	Add well to oil/gas database
Collier	64	5/7/48	Collier Enterprises	Vegetable Farming	Yes	Yes (3) 6/8/93	Pad Only	Additional plug information provided by Exxon; based on information well should be plugged adequately. Monitoring well 1/2 mile from well site shows slight upward increase in chlorides since 1984. It is unclear if the approximately 20 mg/L increase is significant. Heavily used irrigation wells in close proximity to well site show chloride of 265 mg/L similar to values in monitoring well. Slight increase in chlorides may be attributed to pumping in area. Chloride values seem to be typical of area.	Add well to oil/gas database; monitor chloride concentrations in area.
Collier	86	2/2/53	Barron Collier Co.	Vegetable Farming	Yes	Yes (3) 6/9/93	None except portion of oil well access road.	No evidence of any problems from site visit.	Add well to oil/gas database
Collier	92	1/3/49	Barron Collier Co.	Rangeland	Yes	No	Unknown	Site not on original Phase I Target Well list.	Perform site visit; add well to oil/gas database
Collier	98	3/16/49	Barron Collier Co.	Vegetable Farming	Yes	No	Unknown	Site not on original Phase I Target Well list.	Perform site visit; add well to oil/gas database

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Collier	112	10/31/49	Pacific Land Co.	Vegetable Farming	Yes	Yes (3) 6/14/93	None	Area of well site plowed up. No evidence of any problems from site visit.	Add well to oil/gas database
Collier	125	1/19/53	Collier Co.	Reservoir for citrus grove	Yes	Yes (2) 10/12/93	None	Nearby monitoring wells show no chloride increases; no evidence of any problem after site visit. Not on original Phase I Target Well list.	Add well to oil/gas database
Collier	136	5/31/52	Lely Development Corp.	Fallow Field	Yes	Yes (3) 6/10/93	Pad Only	No evidence of problem. Water supply requirements in area required frequent monitoring. Big Cypress Basin Board Reports indicate no increases in chloride except during low water periods.	Add well to oil/gas database
Collier	311	6/21/64	J.E. Price, Jr.	Limerock Mining	Yes	Yes (3) 6/11/93	Pad Only	No evidence of problem following site visit.	Add well to oil/gas database
Collier	319/319A	1/7/64	Barron Collier Company	Citrus Grove	Yes	Yes (3) 6/8/93	None	R. Caughey (6/27/93) reported that well was plugged by SFWMD (9/12/88)	Remove from Target Well List
Collier	321	5/23/65	Barron Collier Co.	Citrus	Yes	Yes (3) 6/8/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Collier	379	12/31/67	Barron Collier Co.	Unimproved Pasture	Yes	Yes (3) 6/12/93	Pad Only	No evidence of problem following site visit.	Add well to oil/gas database
Dade	115	12/20/49	U.S. Government	Chekika Park	No	Yes (2) 10/12/93	Unknown	Attempt to visit site was made on 10/12/93; Park was closed for season. Site not on original Target Well List.	Follow-up visit

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Dade	129	7/25/51	SFWMD, U.S. Government	Big Cypress National Preserve	No	Yes (2) 10/18/93	None	Vicinity of site visited; exact well site inaccessible; site not on original Target Well List.	Add well to oil/gas database
Dade	167	3/27/56	State of Florida	Protected State Lands	No	Yes (2) 10/12/92	Pad and access road, no well found	No evidence of problem following site visit; monitoring well data in near vicinity also do not suggest any problem. Site not on original Target Well List.	Add well to oil/gas database
Dade	182	3/14/56	U.S. Government	Protected Federal Lands	No	Yes (2) 10/12/93	None	No evidence of problem following site visit; site not on original Target Well List.	Add well to oil/gas database
Dade	205	10/19/54	State of Florida	Protected State Lands	No	Yes (2) 10/12/93	None	Vicinity of site visited; exact well site inaccessible; site not on original Target Well List.	Add well to oil/gas database
Dade	214	1/23/55	State of Florida	Protected State Lands	No	Yes (2) 10/12/93	None	Vicinity of site visited; exact well site inaccessible; site not on original Target Well List.	Add well to oil/gas database
Dade	331	8/6/65	State of Florida	Protected State Lands	No	Yes (2) 10/12/93	None	According to files this well was given to USGS as a monitoring well (11/8/67). Contact with USGS found nothing on this well. No evidence of site was found during site visit and SFWMD personnel do not know about a well north of the levee.	Add well to oil/gas database
Dade	376	5/29/67	State of Florida	Protected State Lands	No	Yes (2) 10/12/93	None	No evidence of problem following site visit; site not on original Target Well List.	Add well to oil/gas database

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Escambia	132	12/14/51	Escambia County Utility Authority	Undeveloped Wooded Acreage	Yes	Yes (1) 10/7/93	None	Vicinity of site visited; no access to specific site location.	Add well to oil/gas database
Escambia	135	5/22/52	George W. Eubanks	Soybean Field	Yes	Yes (1) 10/7/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Escambia	147	2/2/53	James B. Estes	Corn Field	Yes	Yes (1) 10/7/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Escambia	252	9/20/56	Swift Timber Limited	Pine Forest	Yes	Yes (1) 10/7/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Franklin	32	10/1/46	Unknown	Pine Forest	No	No	Unknown	After further evaluation of data for this site, this well appears to be adequately plugged (June 27, 1993 meeting)	Remove from Target Well List
Glades	152	7/16/53	Shawnee Farms (John Tiedike)	Sugar Cane Field	Yes	Yes (1) 9/24/93	None	No evidence of problem following site visit and interview with property owner.	Add well to oil/gas database
Gulf	B-4	6/11/45	St. Joe Paper Company	Pine Forest	No	No	Unknown	This well was constructed prior to permitting period encompassed by Phase I Assessment. No further assessment for this site was conducted during Phase II.	This well should be assessed with other prepermit period wells. Should be removed from Target Well List
Hendry	133	2/21/52	Collier Enterprises	Unimproved Pasture	Yes	Yes (3) 6/14/93	Pad Only	No evidence of problem following site visit.	Add well to oil/gas database
Hendry	162	5/13/53	Felda Groves	Citrus Grove	Yes	Yes (1) 9/24/93	None	No evidence of problem following site visit.	Add well to oil/gas database

• Site visited by:
1 = Woodward-Clyde
2 = FDNR
3 = Collier Resources Co.

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Hendry	163	6/15/54	Turner Foods	Citrus Grove	Yes	Yes (2) 10/12/93	None	Well due north of area of known brine contamination related to permit 355. Other wells upgradient from site also have detected shallow brackish water. No evidence of problem following site visit. Problems during construction and abandonment are reasons for concern about this well.	Add well to oil/gas database
Hendry	171	11/18/53	Graves Brothers Company	Unknown	No	No	Unknown	Site not on original Target Well List.	Perform site visit; add well to oil/gas database
Hendry	207-1 207-2	1/11/55	A. Duda and Sons, Inc.	Citrus Grove	Yes	Yes (2) 10/12/93	None	No evidence of problem following site visit; site not on original Target Well List.	Add well to oil/gas database
Hendry	354	12/17/65	Jack M. Berry	Citrus Grove	Yes	Yes (1) 9/27/93	None	No evidence of problem following site visit; site not on original Target Well List. Plugging information indicates well plugged adequately.	Remove from Target Well List
Hendry	362	1/29/66	Jack M. Berry	Citrus Grove	Yes	Yes (1) 9/27/93	None	No evidence of problem following site visit; additional plugging information indicates well plugged adequately.	Remove from Target Well List
Hendry	414	1/4/70	Unknown	Unknown	No	No	Unknown	R. Caughey provided information that this well was adequately plugged (June 17, 1993 meeting).	Remove from Target Well List

TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Hendry	505	2/27/72	Winthrop-LaBelle Citrus Investors	Citrus Grove	No	Yes (2) 10/12/93	None	Site not on original Target Well List. Well listed on revised listing largely because of high chloride anomaly centered on location. Additional information from USGS indicates large area of chloride anomaly in Northwest Hendry and Northeast Lee Counties. High chloride content is probably connate water and not attributable to oil well.	Remove from Target Well List
Hendry	567	7/3/72	Barron Collier Company	Load area for melon farm	Yes	Yes (3) 6/11/93	Pad Only	No evidence of problem following site visit. Additional information provided by R. Caughey indicates well plugged adequately (June 17, 1993 meeting)	Remove from Target Well List
Hernando	378	12/12/67	Marilyn Ann Maskell	Subdivision	Yes	Yes (1) 9/24/93	None	No evidence of problem following site visit. Exact location of well site not found.	Add well to oil/gas database
Hernando	391	10/3/68	Gregory C. Utterback	Unimproved Pasture	Yes	Yes (1) 9/24/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Highlands	B-1	Unknown	Ben Hill Griffin Inc.	Unknown	No	No	Unknown	Not on original Target Well List. As in the case of B-4, this well precedes the construction permitting period for the Phase I Assessment.	Assess well with other pre-permit period wells. Remove from Target Well List
Hillsborough	29	1/4/49	Unknown	Unimproved Wooded Area	No	Yes (1) 9/23/93	None	Not on original Target Well List; no evidence of problem following site visit.	Add well to oil/gas database

* Site visited by:
1 = Woodward-Clyde
2 = FDNR
3 = Collier Resources Co.

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Hillsborough	270	11/30/60	Sumner Family Trust	Wetlands Floodplain	No	Yes (1) 9/23/93	None	Vicinity of site searched; actual well site inaccessible; no evidence of access road.	Add well to oil/gas database
Lee	160	9/26/53	Karl H. Schewe	Wetlands/ Unimproved Pasture	Yes	Yes (1) 9/23/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Lee	161	9/14/53	Unknown	Strip Mall Parking Lot	No	Yes (2) (?)	None	At June 17, 1993 meeting R. Caughey indicated that well was under parking lot; no further action taken during Phase II. Details of site in Ft. Myers office files.	Add well to oil/gas database
Lee	208	9/20/93	Charles R. Johnson	Gold's Gym	Yes	Yes (1) 9/23/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Levy	13	6/8/46	State of Florida	Goethe State Park	Yes	Yes (1)(2) 9/26/93 7/27/93	Wellhead	Wellhead has inoperable valve which controls artesian flow; no subsurface leakage visible; wellhead fittings badly corroded.	Add well to oil/gas database; currently on SRWMD inventory of abandoned artesian wells. Periodic inspections recommended to ensure no leakage. Recommend plug as funding becomes available.
Levy	21	8/7/43	Georgia Pacific	Pine Forest	Yes	Yes (1) 9/8/93	Wellhead	Wellhead has operable valve which controls artesian flow; no subsurface leakage visible; wellhead has "recently" been reworked no signs of corrosion above ground.	Add well to oil/gas database; currently on SRWMD inventory of abandoned artesian wells; periodic inspections recommended to ensure no leakage. Recommend plugging as funding becomes available.
Levy	69	12/1/49	Georgia Pacific	Timberland	Yes	Yes (1) 9/8/93	None	No evidence of problem following site visit.	Add well to oil/gas database

Site visited by:
1 = Woodward-Clyde
2 = FDNR
3 = Collier Resources Co.

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Levy	110	7/17/50	Georgia Pacific	Timberland	Yes	Yes (1) 9/8/93	Wellhead	Wellhead has operable valve which controls artesian flow; concrete pad has been undermined by surface runoff; wellhead badly corroded; casing subject to corrosion below concrete pad.	Add well to oil/gas database; well on SRWMD inventory of abandoned artesian well; periodic inspection during dry weather conditions to determine subsurface leakage; recommend plugging as funding becomes available.
Levy	199	8/17/54	Georgia Pacific	Timberland	Yes	Yes (1) 9/8/93	Wellhead	Wellhead has inoperable valve which controls artesian flow; wellhead badly corroded.	Add well to oil/gas database; well on SRWMD inventory of abandoned artesian wells; periodic inspection during dry weather conditions to determine subsurface leakage; recommend plugging as funding becomes available.
Osceola	8	8/21/48	Church of Jesus Christ of Latter Day Saints Corp.	Unknown	No	No	Unknown	Site not on original Target Well List.	Add well to oil/gas database. Visit site or contact property owner.
Osceola	31	6/19/48	W.P. Hayman	Pasture	Yes	No	None	Based on interview with property owner, no evidence of problem; site not on original Target Well List.	Add well to oil/gas database
Osceola	91	10/10/48	Daryl Carter Triple E Ranch	Pasture	Yes	No	None	Based on interview with property owner, no evidence of problem; site not on original Target Well List.	Add well to oil/gas database
Osceola	539	3/23/72	Southport Ranch	Sod Field	Yes	No	None	Based on interview with property owner, no evidence of problem.	Add well to oil/gas database

Site visited by:
1 = Woodward-Clyde
2 = FDNR
3 = Collier Resources Co.

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Osceola	543	4/23/72	Southport Ranch	Pasture	Yes	No	Pad Only	On Phase II Proposal Table as permit 534, should be 543. Based on interview with property owner, no evidence of problem; site not on original Target Well List.	Add well to oil/gas database
Palm Beach	47	3/16/49	Giovanni Gallina	Citrus Grove	No	Yes (1) 9/24/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Pinellas	75	7/8/48	Post Gateway Assoc.	Apartment Complex	Yes	Yes (1) 9/24/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Pinellas	123	5/20/53	SWFWMD	Undeveloped Wooded Wetlands	No	Yes (1) 9/24/93	None	Vicinity of well site searched; exact location of well site not accessible; no evidence of problem.	Add well to oil/gas database
Pinellas	131	9/26/57	SWFWMD	Undeveloped Wooded Wetlands	No	Yes (1) 9/24/93	None	Vicinity of well site searched; exact location of well site not accessible; no evidence of problem.	Add well to oil/gas database
Pinellas	170	4/15/59	Moss Branch Acres	Subdivision	No	Yes (1) 9/24/93	None	Vicinity of well site searched; not able to locate exact location of well site; no evidence of problem.	Add well to oil/gas database
Putnam	96	12/31/49	Department of Environmental Protection	Pasture	No	No	Unknown	No evidence of site on aerial photography	Visit site; add well to oil/gas database
Santa Rosa	229	3/26/55	Champion International Corp.	Timberland	Yes	Yes (1) 9/28/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Santa Rosa	674 674A	11/21/73	Champion International Corp.	Cultivated Field	Yes	Yes (1) 9/28/93	None	No evidence of problem following site visit.	Add well to oil/gas database

* Site visited by:
1 = Woodward-Clyde
2 = FDNRR
3 = Collier Resources Co.

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TABLE 1
Field Reconnaissance Results and Recommendations for Target Wells
Continued

County	Permit Number	Date Plugged	Property Owner	Land Use	Property Owner Contacted	Site* Visit (Date)	Evidence of Well Site	Remarks	Recommended Action
Walton	65	8/31/47	Unknown	Pine Forest	No	No	Unknown	Additional interpretation of data for site indicates that well is plugged adequately (June 17, 1993 meeting). No further action taken for Phase II.	Remove from Target Well List
Walton	206	8/10/54	Sandestin Resort	Undeveloped Woods	Yes	Yes (1) 9/29/93	None	No evidence of problem following site visit.	Add well to oil/gas database
Washington	154	12/21/53	First National Bank of Ohio	Pine Forest	Yes	Yes (1) 9/29/93	None	No evidence of problem following site visit and after discussions with previous property owner.	Add well to oil/gas database
Washington	164	5/15/53	First National Bank of Ohio	Pine Forest	Yes	Yes (1) 9/29/93	None	No evidence of problem following site visit and after discussions with previous property owner.	Add well to oil/gas database

APPENDIX A

State of Florida



Department of Natural Resources

Memorandum

June 4, 1993

TO: Walt Schmidt

FROM: R. S. Caughey *RS*

SUBJECT: Assessment of Oil/Gas Wells Abandoned between 1943-1974
Within the State of Florida

The Woodward/Clyde study (DNR-C-7683) of abandoned oil/gas wells in Florida found 51 wells which it deemed may be a problem. Of the 51, thirteen are located in the panhandle of Florida. They are Permit #6 in Bay County, Permits #132, 135, 147, and 252 in Escambia County, and Permit #32 in Franklin County, Permit B-4 in Gulf County, Permits #229 and 674 in Santa Rosa County, Permits #65 and 206 in Walton County, and Permits #154 and 164 in Washington County. These wells are not discussed in this memo. The well files for these counties are not part of the file system in the South Florida District field office, so an adequate review was not possible.

The remaining 38 wells and an additional 23 wells are shown on the attached Central and South Florida Inadequately Plugged Oil Test Well Priority List. This list summarizes the possible or known footage of unprotected USDW. The unprotected USDW is divided into a "Shallow" and a "Deep" column. Shallow refers to unprotected USDW's from ground level to about 700'. Deep refers to USDW's 700' or more below ground level. The shallow and deep column in no way refers to any conventionally accepted aquifer classification system. Instead it was based more on surface casing setting depth. Most surface casing being set at or below 700, and so all or most of the "shallow" USDW's are protected if this casing is properly cemented and plugged.

Following the list are "Casing Schematic" sheets for each well on the list. The casing schematic shows the casing, the cementing, and the plugging details of each well. Some schematics have additional data such as the FW/SW contact and comments regarding how USDW's could be contaminated by salt-water aquifers.

Where data was available, calculated water quality diagrams are reproduced on the back of the casing schematic sheet. The casing, cementing, and plugging is redrawn relative to the WQ in the area of the well. This diagram will give some reasonable measure of the quality of the water in the unprotected USDW's. Water quality should be a factor in prioritizing possible problem wells.

Some well casing schematics have on the reverse side a map showing the Upward Flow (discharge)/Downward Flow (recharge) areas. Wells within the recharge areas received a lowered priority in the Woodward/Clyde report because flows in unprotected USDW's

Walt Schmidt/R. S. Caughey
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June 4, 1993

were assumed to be flowing down hole. With fresh-water moving downhole, no salt-water can move up hole to contaminate USDW's. This assumption may be true well within the recharge areas. However, in borderline areas this assumption should be used with caution. For example, five wells on the list in Levy County are six to 10 miles within the recharge area, and one well (Permit #378) in Hernando County is 20 miles into the recharge area, but all are reported to be flowing at the surface.

Although Woodward/Clyde identified 51 "problem" wells and this writer added 23 more via this memo, 15 of these wells could be eliminated. These 15 wells are listed below with a brief explanation for elimination:

B-1	-	Pre-permitting
B-5 (1)	-	"
B-5 (2)	-	"
319	--	Well has been plugged
414	-	Well plugged 11/19/91 as Permit #478
152	-	Too much junk in hole for re-entry
567	-	Additional well file evidence found for good csg cmt job
161	-	Buried under parking lot of major shopping plaza
331	-	No shallow problems, maybe USGS monitor well, so well has a responsible party in charge
123	-	TD 1449', FW/SW @ 500' bmsl; WMD could do this one
131	-	PA is O.K.. Open annulus doubtful because <u>probably</u> drilled w/cable tool
378	-	Problem is comingling of aquifers behind annulus, but WQ appears similar
391		so possibly O.K.
539	-	Comingling of deeper USDW's in annulus is main problem; if WQ_s.milar
534		then O.K.

If these 15 wells are eliminated, the total project well number will be 59. Some additional wells could possibly be eliminated as operators find additional casing cementing and plugging records within their company files. Worthy of comment at this time is of these 59 remaining wells, 16 or 27 percent made the list largely or entirely because there is no record of a surface casing shoe plug. Without this casing shoe plug, salt and brackish water could move into the surface casing and then into shallower aquifers through corrosion holes in the surface casing. Well records indicate that nine other South Florida wells had cement plugs at the surface casing shoe, but no retaining device was used to hold the cement in place. Experience in South Florida has shown that cement will "disappear" into the cavernous/boulder zone unless a retaining device is used at the surface casing shoe. The 25 wells with questionable surface casing plugs are: 222, 288, 381, 393, 279, 388, 397, 250, 12, 46, 373, 278, 235, 225, 354, 372, 393, 343, 351, 121, 134, 130, 76, 638 & 271.

RSC/jg

Central and South Florida
Inadequately Plugged Oil Test Well Priority List

<u>Permit No.</u>	<u>County</u>	<u>Unprotected USDW (In Feet)</u>		<u>Proximity To Public Water Supply (miles)</u>	<u>Remarks</u>
		<u>Shallow</u>	<u>Deep</u>		
B-5 (1)	Charlotte	None	700	?	"hot spring"
B-5 (2)	Charlotte	None	900	?	Pre-permitting
178*	Charlotte	213	100	> 3	Flowing
310*	Charlotte	200	1125	> 5	Flowing?
17*	Collier	165	900	< 3	No surface csg plug
23*	Collier	161	860	> 5	No surface csg plug
64*	Collier	100	600	> 5	No surface csg plug
86*	Collier	122	730	> 5	No surface csg plug
92	Collier	200	800	?	No surface csg plug
98	Collier	185	700	?	No surface csg plug
103	Collier	123	800	?	Surface csg may have been pulled from ±800'
112*	Collier	192	800	> 5	No surface csg plug
125	Collier	182	800	?	Surface csg cut & pulled @ 163'
136*	Collier	≤ 93	None	< 2	No surface csg plug
311*	Collier	400	400	> 5	No surface csg plug
319*	Collier	Well has been plugged by at least 4/89.			
321*	Collier	0	800	> 5	No top plug; 9 5/8" to GL
379*	Collier	0	600	< 2	9 5/8" to GL w/o annular plug

Central and South Florida

Inadequately Plugged Oil Test Well Priority List (con't)

<u>Permit No.</u>	<u>County</u>	<u>Unprotected USDW (In Feet)</u>		<u>Proximity To Public Water Supply (miles)</u>	<u>Remarks</u>
		<u>Shallow</u>	<u>Deep</u>		
115	Dade	426	600	< 2	
129	Dade	≤ 248	1450	?	
167	Dade	0	1200	< 2	
182	Dade	156	800	< 2	
205	Dade	146	700	< 2	No surface csg plug
214	Dade	50	800	< 2	
331*	Dade	0	800	< 2	9 5/8" to GL w/o annular plug
376	Dade	≥ 43	800	< 2	9 5/8 to GL; surface csg cmt job may be very poor
152*	Glades	0	1250	< 4	Much junk in hole do not re-enter
133*	Hendry	690	650	> 5	No surface csg plug
162*	Hendry	700	600	> 5	Very poor surface csg cmt job
163*	Hendry	400	1400	> 5	Only 220' of 1820' of USDW's are protected?
171	Hendry	600	500	> ?	
207-1	Hendry	400	500	> ?	
207-2	Hendry	600	1300	?	All USDW's are unprotected except first 123'
362*	Hendry	69	350	> 5	9 5/8" to GL; no annular plug
414*	Hendry	Well has been P & A as Permit 478 on 11/19/91.			

Central and South Florida

Inadequately Plugged Oil Test Well Priority List (con't)

<u>Permit No.</u>	<u>County</u>	<u>Unprotected USDW (In Feet)</u>		<u>Proximity To Public Water Supply (miles)</u>	<u>Remarks</u>
		<u>Shallow</u>	<u>Deep</u>		
505	Hendry	0?	400	?	No surface csg plug; high chlorides found in area by SFWMD
567*	Hendry	0?	600	> 5	9 5/8" to GL
378*	Hernando	0	600	< 1	Flowing
391*	Hernando	500?	1300?	< 2	Converted to water well
B-1	Highlands	0	1000	?	Pre-permitting No surface csg plug
29	Hillsborough	200?	1270	?	
270*	Hillsborough	450	0	> 3	
160*	Lee	210	600	< 4	
161*	Lee	170	400	< 4	Under parking lot of major shopping plaza
208*	Lee	415	500	< 2	In 1972 weeping 9600 ppm chloride at surface
13*	Levy	0	0	> 3	Reported flowing
21*	Levy	sample flow - if salty plug well		> 3	No data; Reported flowing
69*	Levy	0	0	> 3	Reported flowing
110*	Levy	Insufficient data; sample flow - if salty plug well		> 3	Converted to water well and flowing

Central and South Florida

Inadequately Plugged Oil Test Well Priority List (con't)

<u>Permit No.</u>	<u>County</u>	<u>Unprotected USDW (In Feet)</u>		<u>Proximity To Public Water Supply (miles)</u>	<u>Remarks</u>
		<u>Shallow</u>	<u>Deep</u>		
199*	Levy	0	0	> 3	Converted to water well and flowing
8	Osceola	670	0	?	No surface csg plug
31	Osceola	--	1300	?	
91	Osceola	--	1450	?	
539*	Osceola	0	Up to 750	> 5	P&A appears OK; possible comingling of deeper aquifers in annulus
534	Osceola	0	Up to 1000	?	Comingling of deeper aquifers in annulus; otherwise P&A OK
47*	Palm Beach	≤ 300	1150	< 4	No surface csg plug
75*	Pinellas	460	0	< 2	
123*	Pinellas	Insufficient data, but TD is 1449' and FW/SW @ 500 bmsl		> 2	
131*	Pinellas	0	0	< 1	If plugs in place as recorded, no problem
170*	Pinellas	≤ 500	0	> 3	Open annulus may provide SW pathway
96	Putnam	700	0	< 2	Comingling of FW & SW aquifers in annulus

* Indicates Woodward/Clyde
priority wells.

Panhandle Florida

Inadequately Plugged Oil Test Well Priority List

Permit No.	County	Unprotected USDW (in feet)		Prox. To Public Water Supply (in miles)	Remarks
		Shallow ($\leq 400'$)	Deep ($> 400'$)		
6	Bay	0	0	> 5	P&A is good
132	Escambia	270	650	< 2	+450' can comeingle
135	Escambia	0	600	> 4	
147	Escambia	0?	700	> 5	No top plug?
252	Escambia	0?	770	< 2	need csg cmt data
32	Franklin	0	0	> 2	P&A is good
B-4	Gulf	0	0	> 3	Csg + cmt protect USDW but no plugs reported
229	Santa Rosa	0	0	> 5	800' of USDW can comeingle
674	Santa Rosa	0	0	< 1	Csg + cmt protect USDW but no plugs reported
65	Walton	≤ 87	0	> 5	P&A is OK
206	Walton	0	500	< 3	No surface csg shoe plug
154	Washington	138	460	< 2	No surface csg shoe plug
164	Washington	≤ 70	650	> 5	No top or surface csg shoe plug reported

Possible Inadequately Plugged Oil Test Wells in Panhandle Florida
 (Flow is downward for all wells)

Permit No.	County	Unprotected USDW (in feet)		Prox. To Public Water Supply (in miles)	Remarks
		Shallow ($<400'$)	Deep ($>400'$)		
73	Washington	0?	450		Need csg + cmt data
79	Washington	0?	350		Need csg + cmt data
156	Washington	± 200	460		
68	Walton	300	200		
169	Walton	300	200		
87	Gadsden	300	800		
25	Calhoun	170	960		No plugs reported
26	Calhoun	200	950		No surface csg shoe plug
70	Calhoun	320	700		

APPENDIX B

(VOLUMES 1 THROUGH 4 ON FILE - OIL AND GAS SECTION)