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FROM: ROBERT E. UHRIG

SUBJECT SL 1 IE INSPECTION REPORT  
11/9/82 NO. 50-335/82-33

NRC CORRESPONDENCE

ST. LUCIE UNIT 1

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**ACTION**

A WRITTEN RESPONSE  
IS REQUESTED

FROM: H.N.PADUANO  
TO: ROBERT E. UHRIG  
NOT LATER THAN: DEC / 6 / 1982

4  
A

## SUMMARY

### RELEASED CONTAMINATED SEWAGE SLUDGE AND CLEAN UP PROJECT

In response to a work order requesting the repair of a clogged sink drain in a wash trough in the RCA, it was discovered that the trough may drain to the sanitary sewage system rather than the laundry holdup and treatment system. Verification was performed by close reinspection of blueprints of the waste plumbing system and flushing a dye through the cleared trough drain. The accessible portions of the sewer lines were surveyed with portable radiation detection instruments and these surveys indicated contamination. Samples of materials from one of the man-holes and from the sewage treatment plant also indicated contamination. Contact with the off-site vendor that removes the residual sludge from the plant identified the geographical areas where the sludge was released. Two fields, approximately 10 miles west of the plant and approximately 200 acres each, were identified as the areas where the sludge from St. Lucie Plant Unit 1 was released. Surveys of the identified areas, and other sludge dumping grounds permitted by the State of Florida Department of Environmental Regulation, were performed by the State of Florida Office of Radiation Control personnel and St. Lucie Plant Health Physics personnel. The results of the surveys identified one field to contain the contaminated sludge with the other fields being non-contaminated. Intensive survey of the remaining field isolated areas that appeared to have the contaminant. These identified areas were excavated and the areas resampled; then the field was resampled by personnel from the office of Radiation Control. A verbal "release", to be followed in writing, was then issued from the Director of Surveillance and Laboratories office of Radiation Control.

## SYNOPSIS

On September 13, 1982 it was determined that the on-site sanitary sewage system at the St. Lucie Unit #1 Nuclear Power Plant contained low level radioactive contamination due to the release from a hand wash sink inside the plant. The appropriate agencies were notified, including the Nuclear Regulatory Commission (NRC) and the State of Florida Office of Radiation Control, Department of Health and Rehabilitative Services (DHRS). Through the sludge disposal contractor's records, required by the Department of Environmental Regulations (DER), the exact dumping areas were located, and on September 15, 1982, the presence of low level radioactive contamination in the dumping area was confirmed.

An extensive radiological assessment was then performed by DHRS, in conjunction with the NRC and Florida Power and Light Co. (FPL). This assessment included radiation surveys over the entire grounds as well as extensive sample collection and analysis where radioactive contamination was confirmed. Over 300 soil, water and grass samples were collected and analyzed. This assessment continued until clean-up had been completed and the grounds released on October 5, 1982 (meeting the release criteria established by DHRS). It was determined that the reclaimed contaminated sludge represented a small area of approximately 3400 ft<sup>2</sup> since most of the deposits being dumped were small isolated droppings. Independent radiological assessments performed by both DHRS and FPL concurred that there was a negligible radiological impact to both the dumping area environment and the public health. Two areas of excavated grounds are presently being resoled by FPL.

## CHRONOLOGY OF EVENTS

### RELEASED CONTAMINATED SEWAGE SLUDGE AND CLEAN UP PROJECT.

1975 Wash trough installed in RCA, for washing hands, etc.  
At this time sanitary sewage went to septic tank.

1978 Trough began to be used for decontaminating respirators  
and similar items.

1979 December Sanitary sewage treatment plant put into operation.  
Septic tank system phased out.

1982 January Sludge from sewage treatment plant pumped and transferred  
to field.

1982 June Another sludge pumpout and release to field.

1982 September 13, Drain from trough cloggs.  
September 13, Repairs to drain indicate possible mis-plumbing.  
NRC LER reported (verbally).  
September 14, Verification performed by blueprint studies and dye test.  
Sampling indicates contamination in lines and sludge tanks.  
Notification to State of Florida Office of Radiation  
Control (DHRS).  
September 15, Contact with vendor identifies areas where material  
disposed.  
Press release made.  
Preliminary general analysis of situation.  
DHRS/FPL confirmation of contaminated material in  
identified areas.  
September 16 through September 28,  
General and intensive survey and sampling identifies  
smaller contaminated area.  
Excavation and removal of contaminated material.  
Resurvey and resampling of previously defined areas.  
September 27, Areas released by FPL for final survey by Office of  
Radiation Control.  
October 4, Office of Radiation Control resurveys and resamples area.  
October 5, Verbal release of property from Office of Radiation  
Control.  
October 6, Written documentation of release of property from Office  
of Radiation Control.

Date undefined Ultimate deposition of collected material in NRC licensed  
burial facility.

## DETAILS

Release contaminated sewerage sludge and clean-up project.

During the last final construction period of Plant St. Lucie Unit 1, a wash trough was installed in the RAB 19.5' corridor. The purpose of the trough was for washing hands without having to enter the dress-out room. During the installation phase it was known that this trough drained to the sanitary sewer system. This system drained to a septic tank which was located under what is now the annex to the service building.

In 1978, during an outage, the trough became a respirator wash down facility. Due to a turnover of personnel and the trough being located in the RCA, the drain path was assumed to drain to either the contaminated laundry treatment system or the equipment drain treatment system. With time, miscellaneous small low level contaminated items were also washed in this trough.

During December of 1979, the sanitary sewer system was routed from the septic tank to an onsite treatment plant. Up until this time, the residual septic waste was pumped to a transfer truck and released at the Ft. Pierce Sewerage Treatment Plant. The pump-outs occurred quite frequently, sometimes daily. Since the use of the sewerage treatment facility, the liquid effluent is released to the intake canal. This release occurs continuously and is monitored monthly by the Chemistry Department. The results of the monthly sampling indicated no radionuclides above the lower limit of detection (LLD) of the measuring system.

Due to the size of the sewage treatment facility, the residual sludge had been pumped-out twice. The removed sludge was not monitored since the sewage system was not located in plant's RCA. The sludge was transferred to a DER approved dumping ground and released for fertilizer.

Approximately the tenth of September 1982, the drain clogged. On the 13th of September a worker, assigned to repair the drain, suspected that the drainage flowed to the sanitary sewer system. This was verified by studying the blueprints of the installation and by flushing a concentrated dye through the trough and drain observing the presence of the dye in a sanitary sewer manhole. With this dye acting as a positive verification of flow path, surveys of the sewer system were conducted. The survey of the manholes was performed by entering each manhole and surveying the area with a RM-14 (Eberline Rate Meter) with a HP-210 (Pancake Style GM) probe. The results indicated contamination from 4 to 300 times higher than the background count rate (see Fig. 1). Samples were drawn from the sludge tank of the treatment facility, they also indicated contamination of Cobalt-60 to the levels of one to ten picoCuries per gram.

At this time, an overview of the operating characteristics of the sewerage treatment plant and the radionuclides present yielded the following information;

1. The system acts as a concentrator for insoluble materials, while solubles pass through.

2. The concentrations of solubles at any one sampling time was indeed below the LLD, the sludge acting as a concentrator, integrated a low level protracted release, into a higher level residue.
3. { The septic tank was pumped much more frequently than the sludge tank (50 to 100 times more often), therefore the concentration would be (at least) 50 to 100 times less.
4. The cobalt salt in the sludge deposited on the grounds is in an insoluble form and previous studies of cobalt migration through highly organic material (swamp muck, organic wastes) have indicated that the cobalt is ionically bound to the organic media.

By contacting the vendor who removed and released the sludge it was identified where the sludge was released and where in the release areas the contaminant was present. Results of auditing the vendors records showed that of seven potential fields that were permitted by Department of Environmental Regulation to receive this type of waste, only two fields were listed as receiving material from plant St. Lucie Unit 1.

The fields are located about 11 miles west of the plant; south of Midway Road, west of Glades Road in St. Lucie County. The permitted property is about 3.5 miles of land, subdivided into 10 smaller fields. Of the ten fields, the two that were identified as repositories for the sludge from Unit 1 are referred to, by the vendor, as Field 2A about 100 acres and Field 3 about 120 acres. Refer to Maps 1 & 2.

An initial survey of Field 3 indicated a definite area of contamination in a general area, approximately 20 ft. by 60 ft. This area was excavated to an average depth of 6 inches; the material was placed in LSA boxes and returned to the plant site.

Further survey by personnel using hand instruments identified more areas of contamination. Due to the size of the Field (#3) and the need to further survey Field 2A, a decision was promulgated to utilize the Office of Radiation Control's aerial surveillance system and a helicopter to expedite a general survey.

The aerial surveillance system consists of a seven inch diameter, five inch tall plastic scintillator gamma detector and a Ludlum model 2 count ratemeter. The system has been in use for many years and has proven to be an effective screening tool for the detection of low levels of radiation.

With this device located on the floor of the helicopter, three persons (pilot, state person to operate device, and FPL person to reference maps and communicate to ground crew) preceeded to survey the area from an altitude of approximately 100 feet, traversing the field in 100 ft. wide paths. When a hot spot (elevated radiation measurement) was detected, the helicopter would hover over the spot and the ground crew (in communication with the helicopter) would demarcate the identified spot by stakes. This process was used to identify the general area where contamination was suspected to be followed by a thorough ground level survey.

This practice was accepted by the responding parties (FPL, NRC and Office of Radiation Control) and was used to screen all of the fields, whether or not they were identified release areas.

To assist in locating and sizing identified areas within the field, the field was demarked into 100 foot grids. All hot spots could then be referenced to the stakes. This grid also enabled an orderly search with minimum backtracking.

To better define the hot spots detected from the air, the aerial surveillance system was mounted on the tailgate of a pick-up truck and the entire field surveyed such that the paths taken were within a wheelbase width of the previous path.

As elevated exposures were encountered, the grounds were demarcated by spray paint and documented accordingly on maps. Intensive surveys with hand-held instruments further refined the areas identified (See Fig. 2).

Concurrently with this activity, Field 2A was subjected to intensive surveys with hand held instruments. Samples were collected and all results were below LLD. (See Figs. 3, 4, and 5).

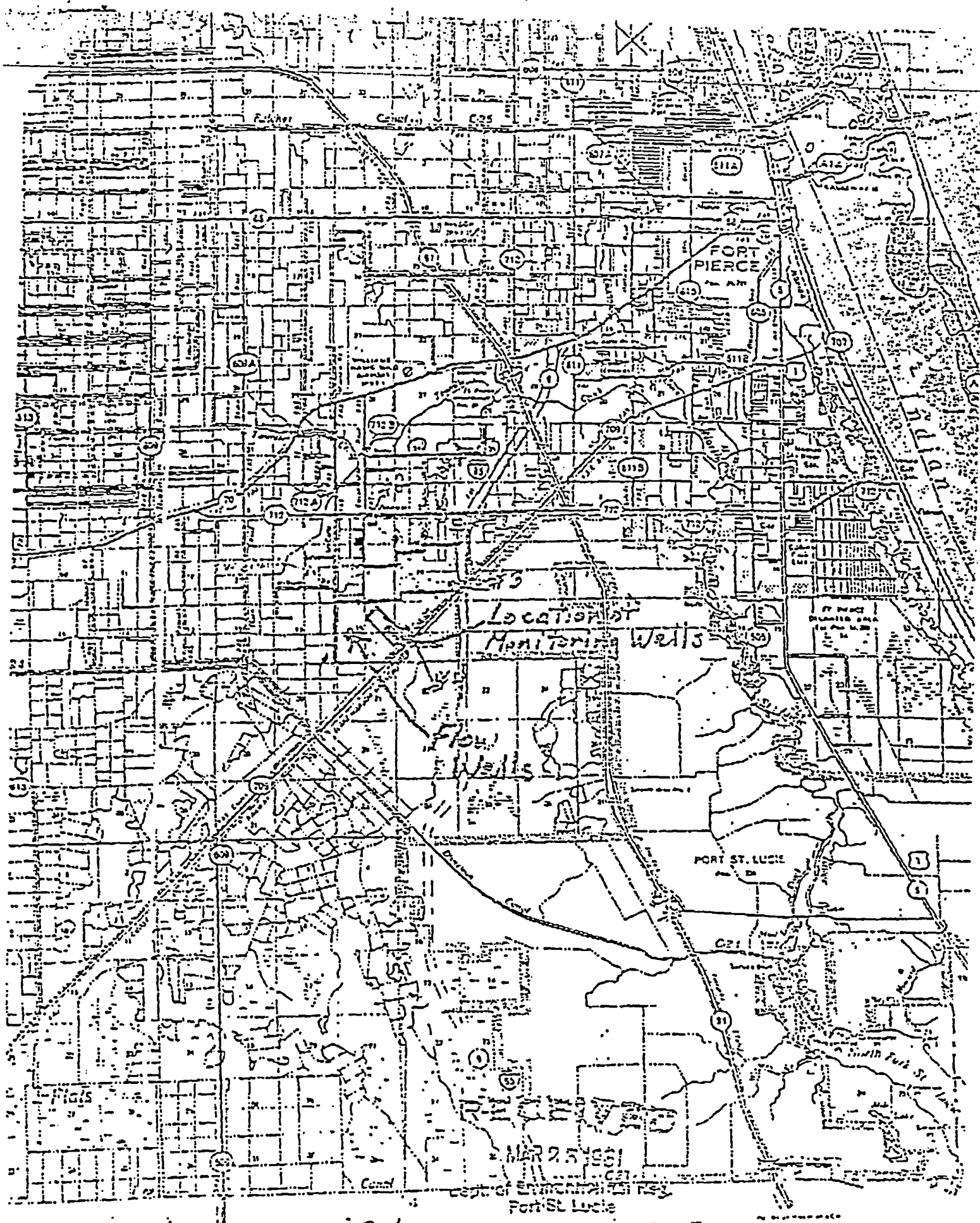
Release limits were established by DHRS at a value of 5 picoCuries per gram (5 pCi/gm) as the maximum allowable residual concentration. Intensive survey and lab analysis of samples collected from the identified hot spots led to the discovery that the contamination was present in long (few hundred feet), thin (1 to 2 foot wide) areas on the surface ground.

After numerous samples were analyzed, the results were compared to the associated instrument readings and a usable correlation generated. This correlation showed that contact readings less than 10  $\mu$ R/hr gave reasonable assurance that the residual contamination was less than 5 pCi/gm of Co-60. Using this correlation, areas were defined, via instrument readings, for excavation. Post excavation sampling was performed to insure removal of contaminant to the required level (See Fig 6 thru Fig 9).

Notification to the State of Florida Office of Radiation Control was performed at the end of the excavation and resampling period. State personnel then resurveyed the area, collected samples and, at the finish of their analysis stage, declared the field clean. (i.e. residual contamination levels of Co-60 below 5 pCi/gm).

As of the date of preparation, the remaining activities are:

1. Refill and seeding of excavation; work is in progress.
2. Final deposition of collected material; shipment to NRC licensed burial facility.
3. Flush out and removal of residual contamination in onsite sewer system; flush, collect and dry sludge, then shipment to NRC licensed burial facility (one possible alternative).





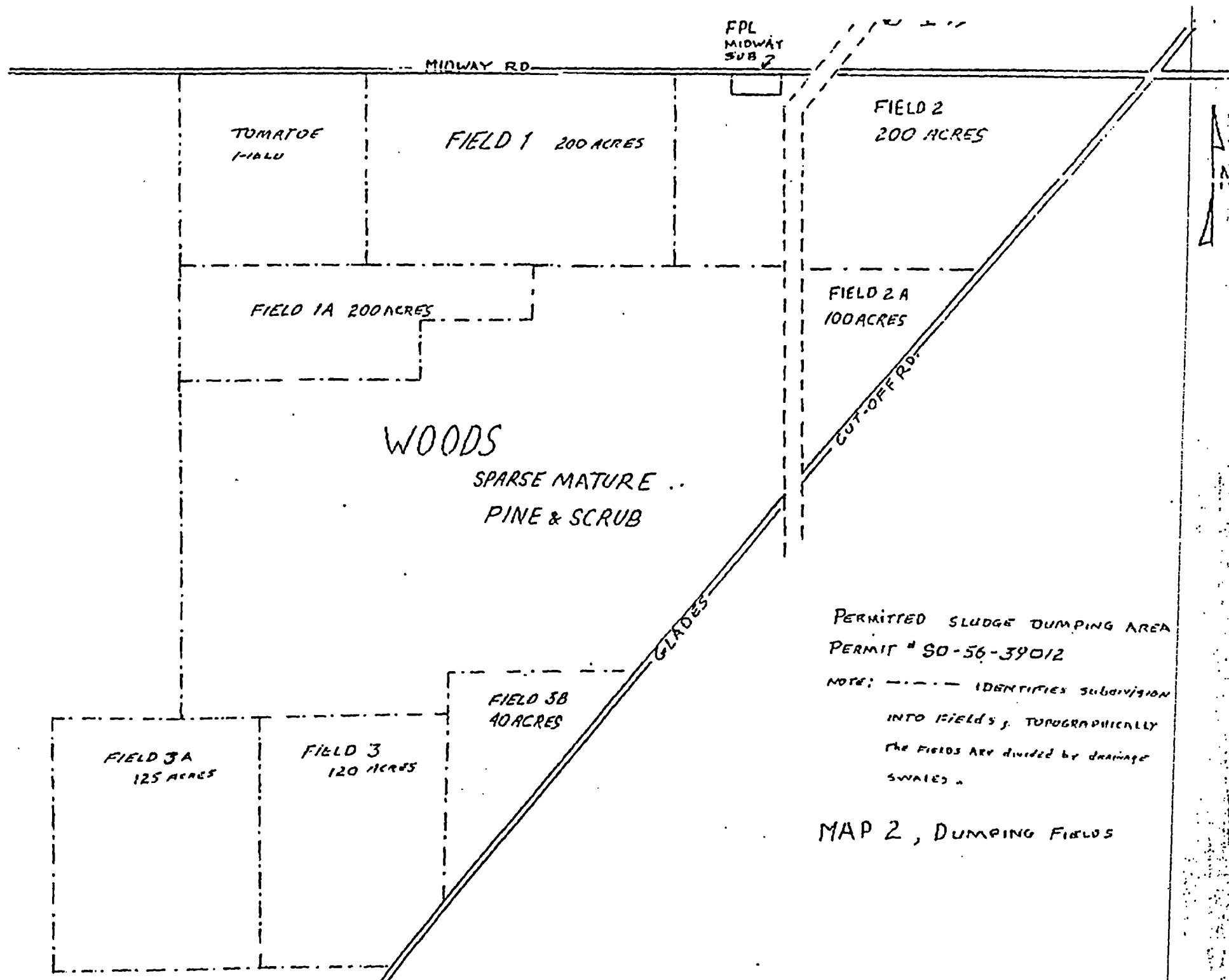


Fig 1

FLORIDA POWER & LIGHT COMPANY  
ST. LUCIE PLANT UNIT NO. 1

SURVEY OF SANITARY SEWER  
MANHOLE

Monitored by McCullough / 7/61

Instrument Type K11-101  
Serial No. 1424

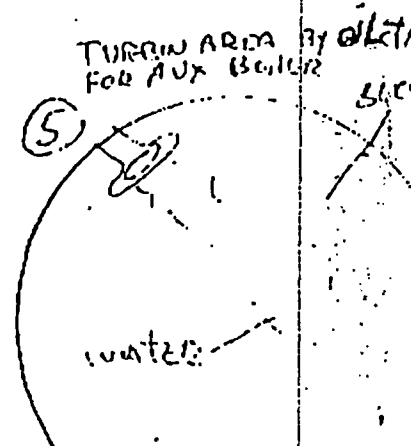
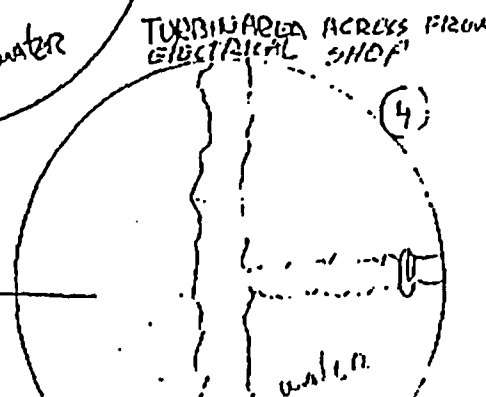
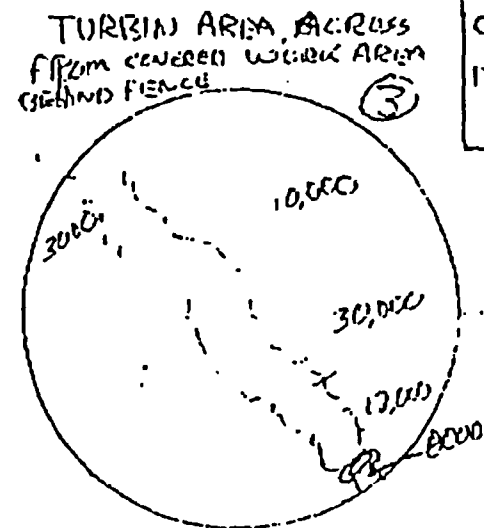
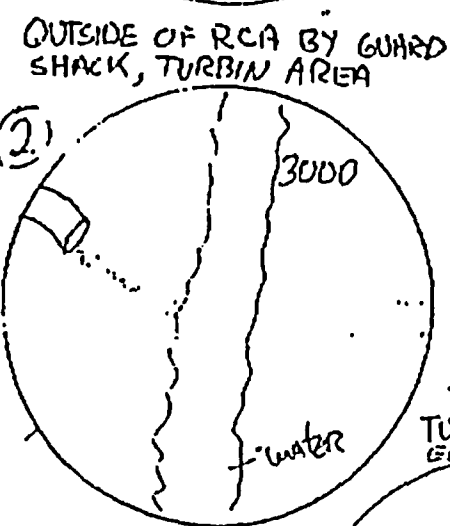
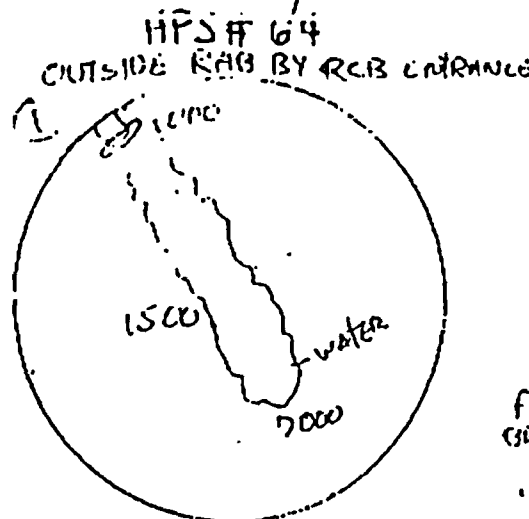
dpm/100 cm<sup>2</sup>      mRem/Hr

Misc. Survey Sheet

SEWAGE SYSTEM

S L OPS

DATE 2004  
DOCT HPS-64  
DOCN \_\_\_\_\_  
SYS HP  
COMP \_\_\_\_\_  
ITM \_\_\_\_\_

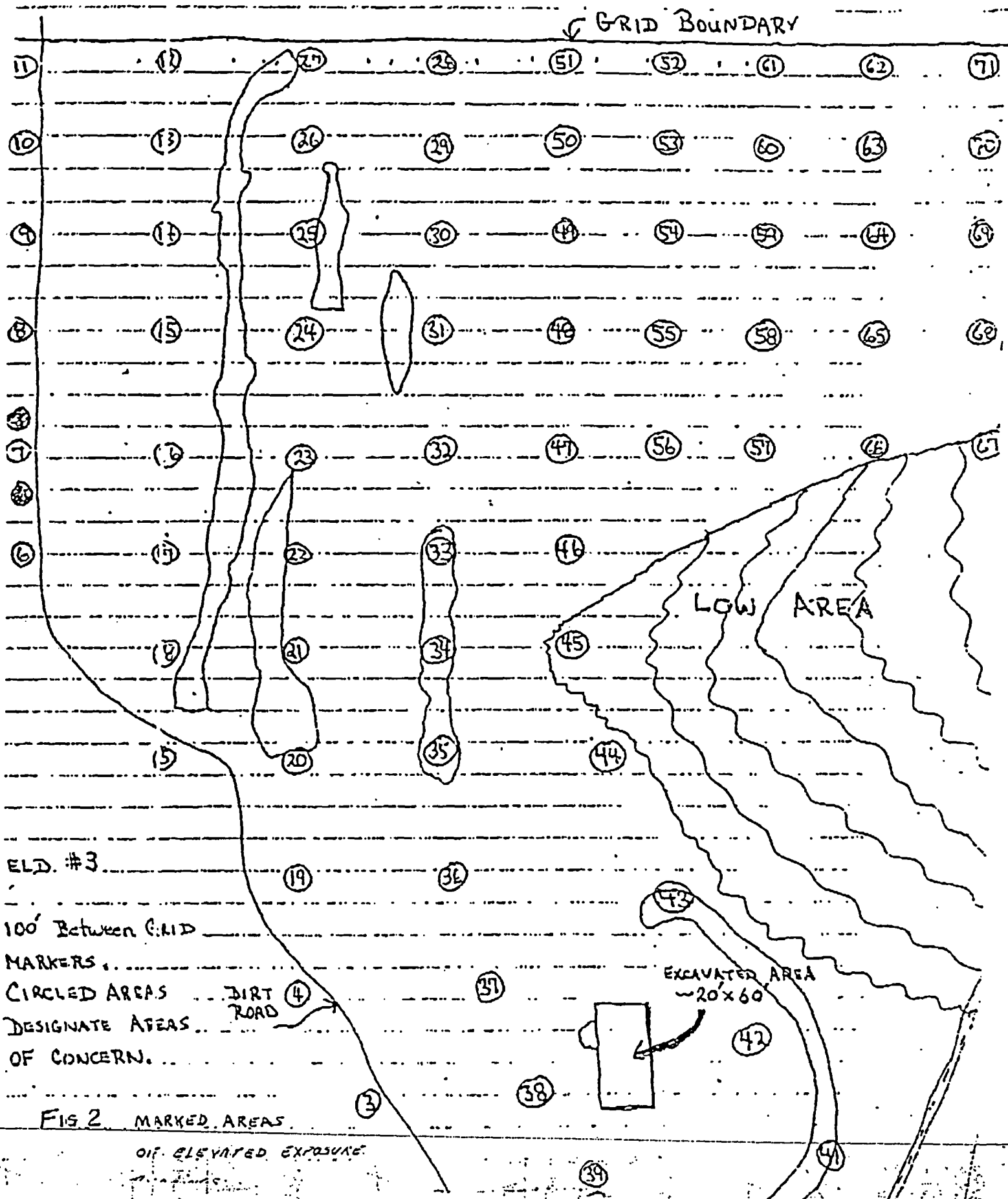


ALL READINGS ARE IN dpm/100 CM<sup>2</sup> AREA

cpm      MDA: 1000      dpm

POSTED AS FOLLOWS:

Uncontaminated Area ( ) Radialton Area ( )  
Contaminated Area ( ) RWP For Entry ( )



# SOUTHERN SECTOR OF FIELD #2A

SOIL SAMPLES TAKEN BY:  
McAllister, Beaurrier, Ross,  
HARRIS, SUMNER.

DATE: 9/17/82

Note: ENTIRE AREA SCANNED  
WITH LUDLUM #2218, Serial  
#, nothing detected  
above background.

NO VISIBLE  
TRUCK PATHS  
IN THIS AREA

I-95

NO VISIBLE TRUCK PATHS  
IN THIS AREA

Well-worn  
truck path

Path veers off to  
right

CREEK

slight indication

Boys

225 & 26 taken in  
area of slight  
indication

CREEK

WOODS

SAMPLES Taken in Woods apart

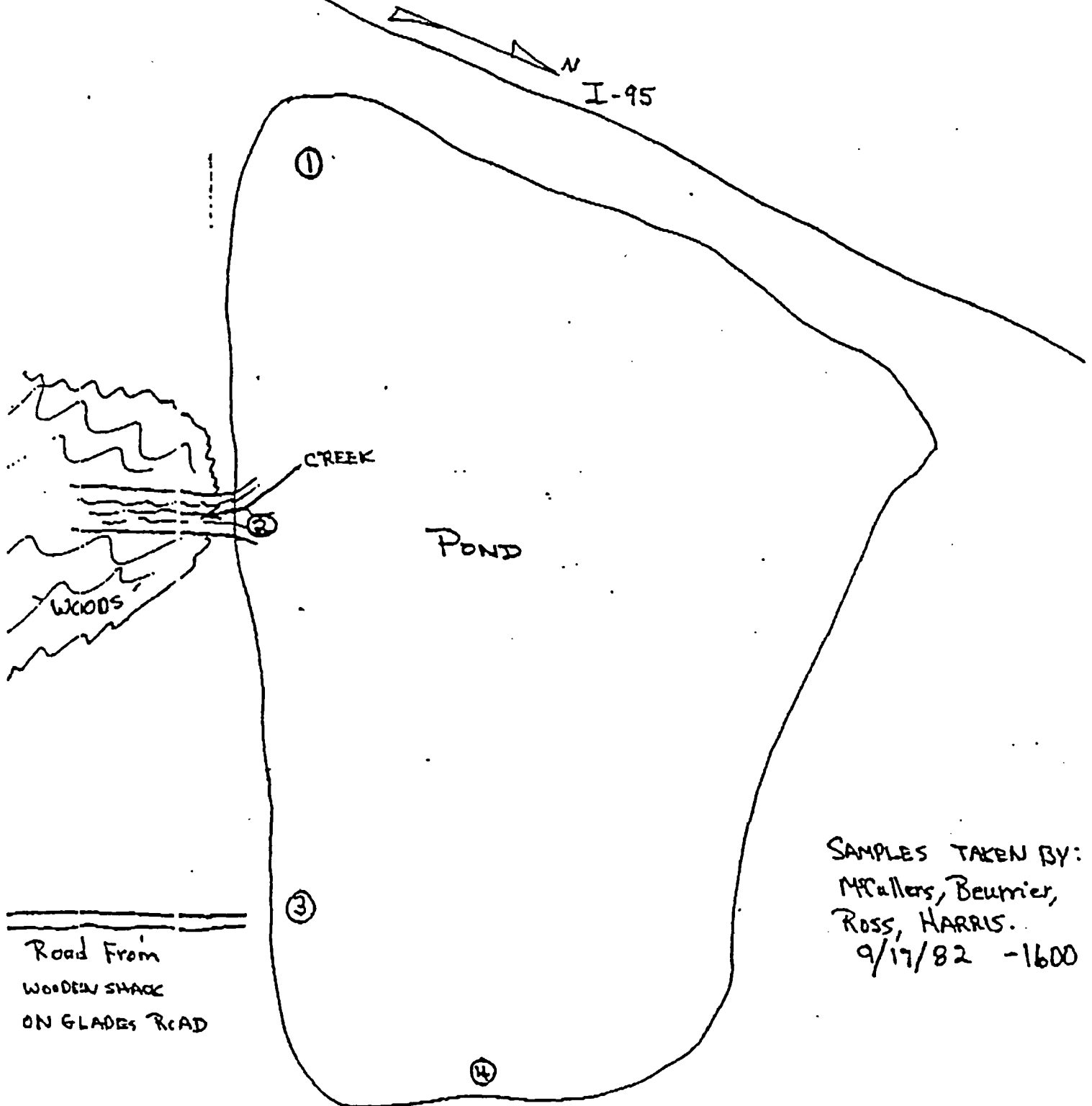
Fig 3

08/08/2005 12:49 PM 7724684167

FILE: ST. LUCIE PLANT

PAGE 13

LOCATION OF WATER SAMPLES  
TAKEN FROM POND IN FIELD #2A



SAMPLES TAKEN BY:  
McAllers, Beumier,  
ROSS, HARRIS.  
9/17/82 -1600

FIG 4

FLORIDA POWER & LIGHT COMPANY  
ST. LUCIE PLANT UNIT NO. 1

DATE 9/16/82  
Time 1000 - 1700

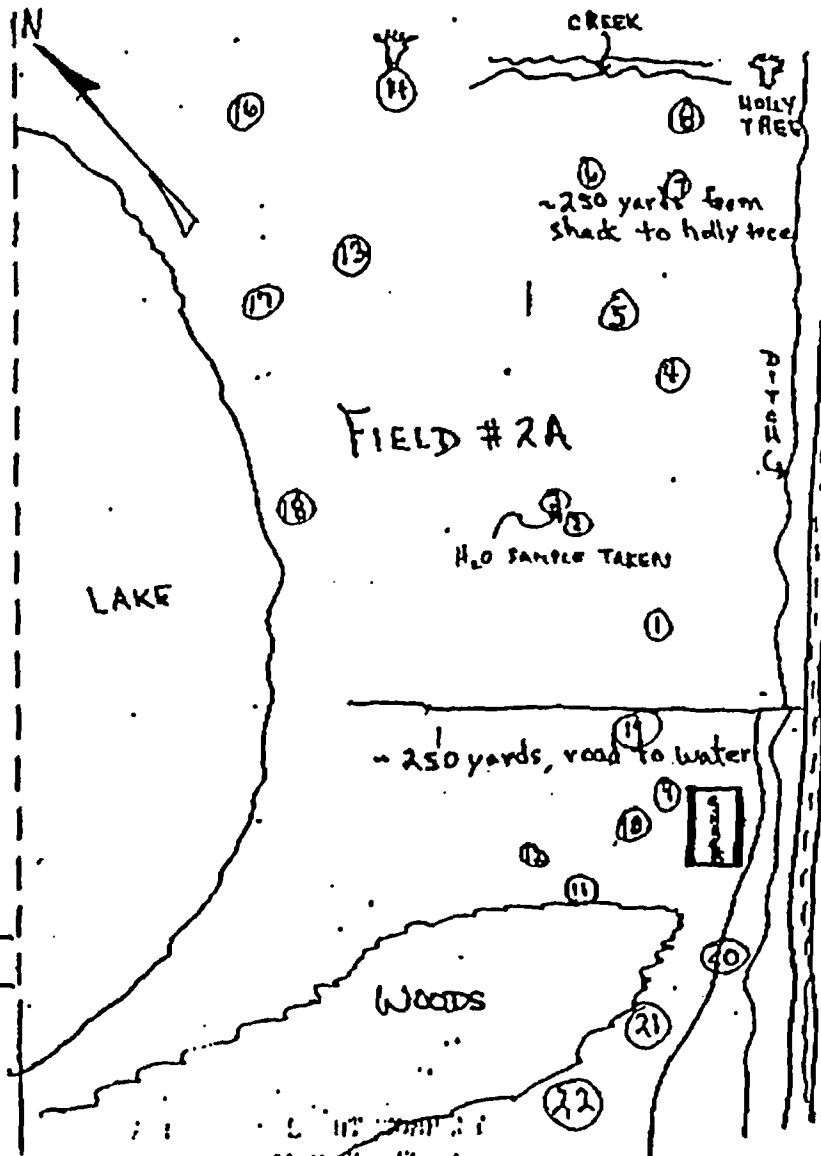
Monitor RUC/Gibbs

Instrument Type NA  
Serial No. ↓

Sample #	dpm/100 cm <sup>2</sup>	mRem/hr
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		

Remarks:

Miss. Survey Sheet  
HPS# 64



S \_\_\_\_ OPS

DATE \_\_\_\_

DOCT HPS-64

DOCH \_\_\_\_

SYS \_\_\_\_

COMP \_\_\_\_

ITM \_\_\_\_

② - LOCATIONS OF  
SOIL SAMPLES  
TAKEN FROM  
FIELD #2A

cpm MDA: dpm  
POSTED AS FOLLOWS:  
Area ( ) Radiation Area ( )  
Area ( ) RMP For Entry ( )  
Area ( ) Area Locked ( )

FIG 5

# INITIAL SAMPLE LOCATIONS FOR FIELD #3.

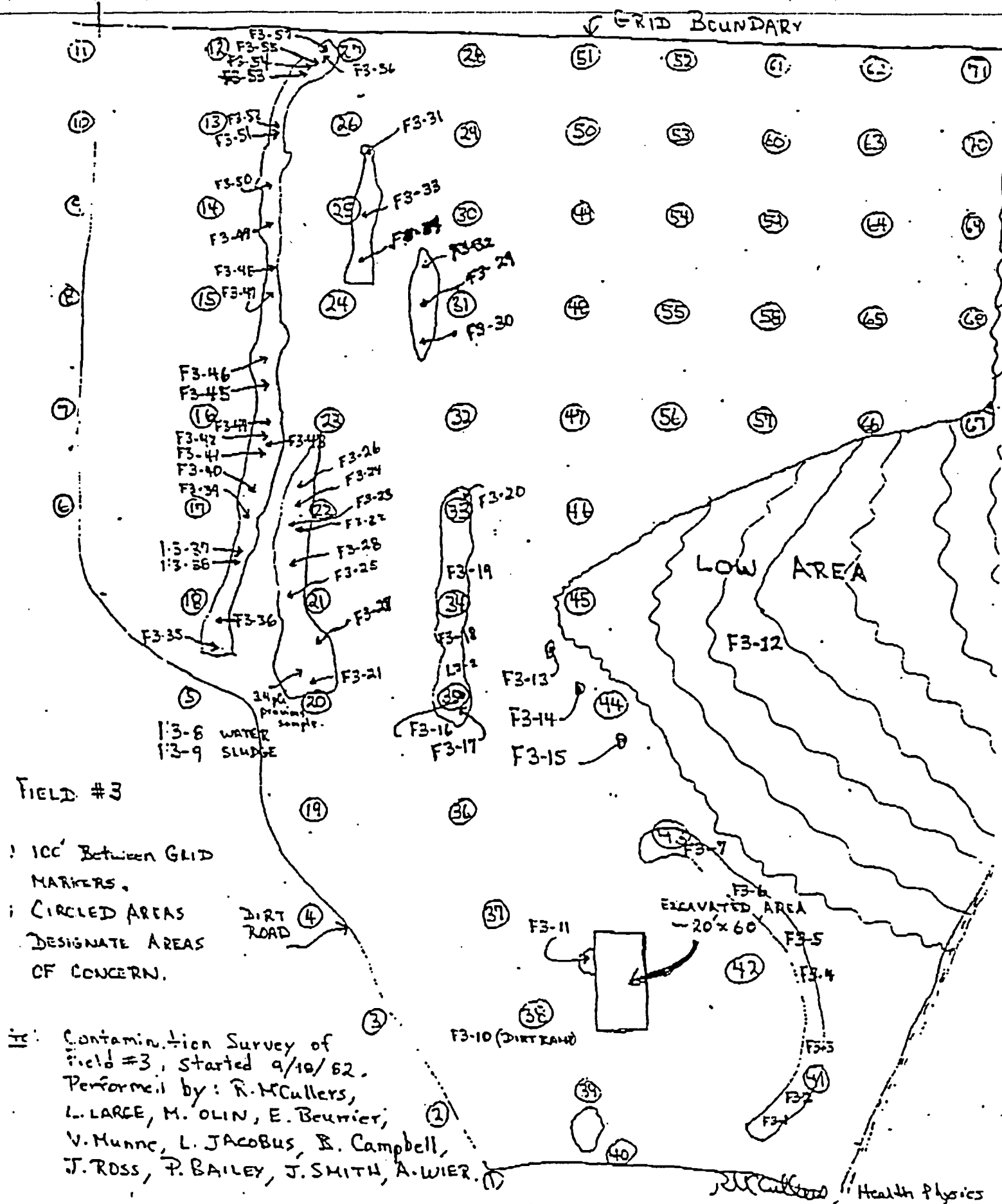


Fig. 6

# LOCATIONS RESAMPLE (R.S.) LOCATIONS

GRID BOUNDARY

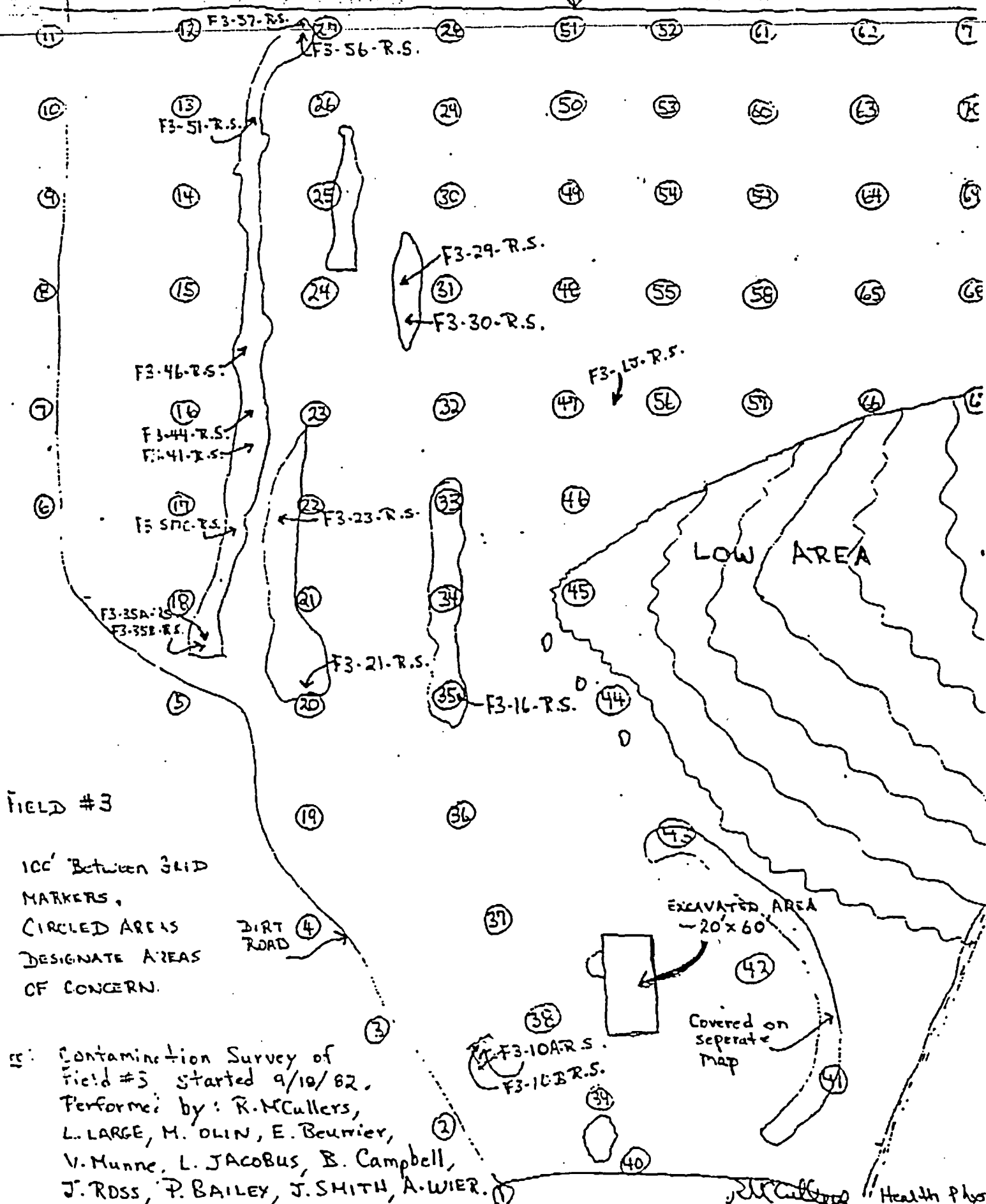
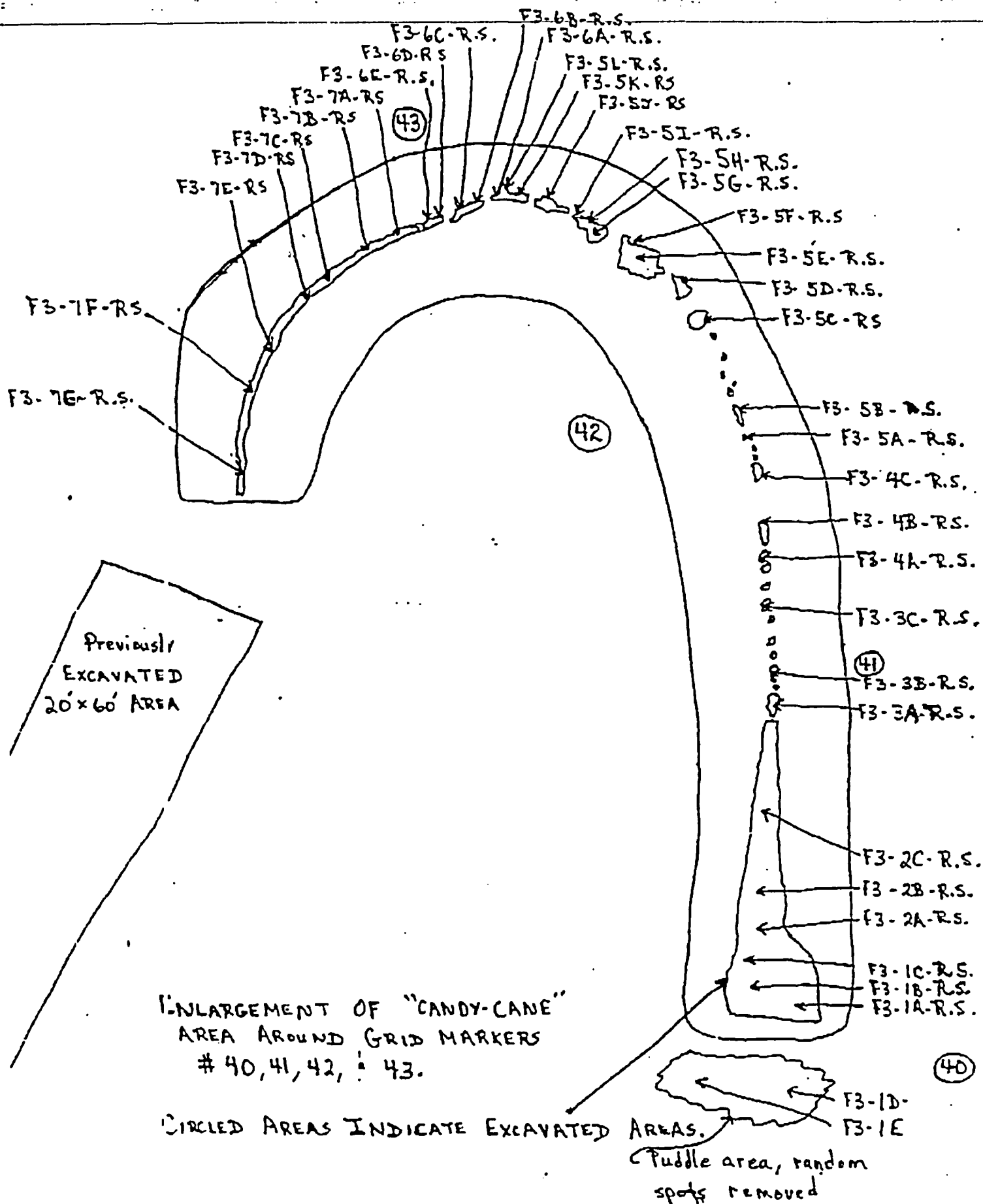
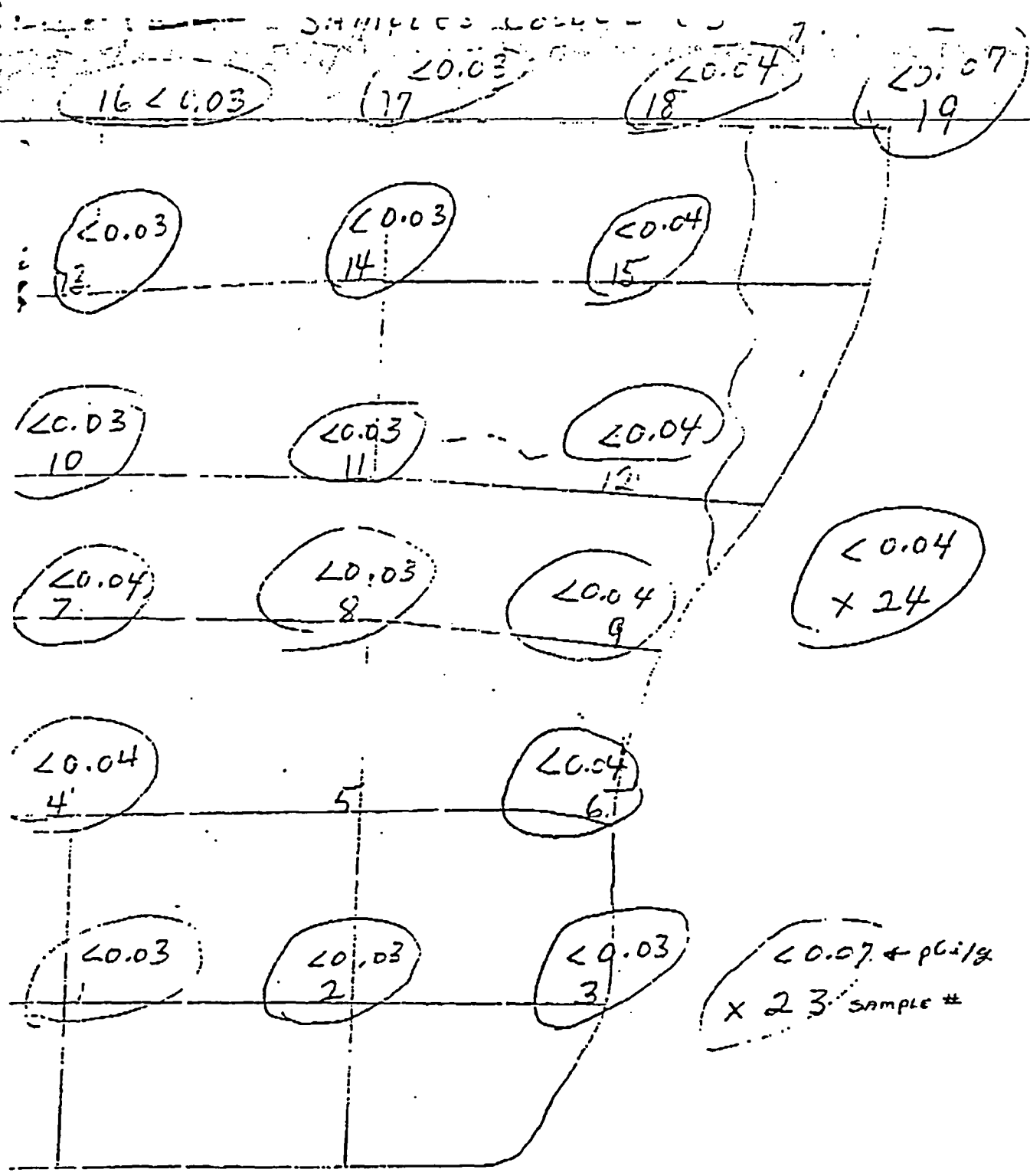


FIG 7







RESAMPLE OF 20' x 60' EXCAVATED AREA.

SAUATION  
 ARZATION

SAMPLE SITES - FPL & HRS

HRS is the Lead Agency  
 For Office of Radiation Control

FIG 9