

Letter Health Consultation

**Evaluation of Groundwater Contamination at the
Tarheel Army Missile Plant (TAMP) Site**

**TARHEEL ARMY MISSILE PLANT (TAMP) SITE
ALAMANCE COUNTY, NORTH CAROLINA
CERCLIS ID: NC7210020544**

**Prepared by:
North Carolina Department of Health and Human Services**

May 4, 2017

**Prepared under Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333**

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

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North Carolina Department of Health and Human Services
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**North Carolina Department of Health and Human Services
Division of Public Health**

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May 4, 2017

David Lown
Federal Remediation Branch Head
N.C. Department of Environmental Quality
217 West Jones Street
Raleigh, NC 27603

John Beasley
U.S. Army Environmental Command
2450 Connell Road, Bldg. 2264
Fort Sam Houston, TX 78234

RE: Tarheel Army Missile Plant (TAMP) Site Potential for Vapor Intrusion

Dear Mr. Lown and Mr. Beasley:

The North Carolina Department of Environmental Quality (N.C. DEQ) contacted the North Carolina Division of Public Health's (DPH) Health Assessment, Consultation and Education (HACE) program in October 2016 regarding the Tarheel Army Missile Plant (TAMP) site. N.C. DEQ staff believe there may be a potential for vapor intrusion at homes near the site and requested DPH's assistance in evaluating possible public health impacts from vapor intrusion. DPH staff visited the site that month with staff from N.C. DEQ, U.S. Army Environmental Command, U.S. Army Corps of Engineers and ARCADIS, the environmental remediation contractor. While visiting the site, DPH staff noticed the proximity of homes to the site. To address the concerns regarding soil vapor intrusion, DPH has reviewed available groundwater data collected on-site and near neighboring homes.

DPH concludes that we do not have adequate data to determine whether groundwater contaminants from the TAMP site are migrating off the site and entering indoor air at residences neighboring the site via the vapor intrusion pathway. While the available groundwater data suggests the potential for vapor intrusion, soil gas and indoor air data are currently not available to evaluate potential residential exposures to contaminants.

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DPH recommends the:

- potentially responsible party (PRP) and/or their contractor begin a complete vapor intrusion investigation [[ATSDR 2016](#)]. This may include: collecting crawl space air, indoor air and outdoor air samples concurrently at homes where the potential for vapor intrusion exists (i.e., within 100 feet of locations where groundwater contaminant levels exceed ATSDR vapor intrusion comparison values (VICVs)); collecting additional data, such as groundwater and soil gas data, off-site to further characterize the extent of contamination and the potential for vapor intrusion at nearby homes; and assessing homes and buildings in multiple seasons (winter and summer) to evaluate seasonal variability.

DPH evaluated physical hazards on site and provided recommendations to the property owner to prevent harm to people's health in a Letter Health Consultation dated March 15, 2017. DPH is available to conduct outreach during future vapor intrusion efforts associated with site. DPH will also continue to evaluate environmental data and exposures to contaminants that may impact public health.

The remainder of this letter provides more detailed information on the evaluation of groundwater data available at the TAMP site.

Background

The TAMP site (CERCLIS ID: NC7210020544) is located at 204 North Graham Hopedale Road in Burlington, Alamance County, North Carolina. The property has 22 buildings on approximately 32 acres. North Graham Hopedale Road borders the site to the east. Businesses are located immediately across the road to the east and back up to the property on the south and west sides. Residential properties back up to the property on the north side. The U.S. Army formerly owned the site, using it for aircraft production and tank rebuilding. Saucier Inc. acquired the property in 2013, and there are currently no activities on-site. Former operations and leaking underground storage tanks on site have contaminated soil and groundwater, particularly under the Waste Accumulation Pad located toward the center of the site, with petroleum hydrocarbons and chlorinated volatile organic compounds (VOCs) [Johnson 2003].

The TAMP site is located in the Carolina Slate Belt of North Carolina's Piedmont region. This is composed of granitic bedrock overlain by silty and clayey saprolitic soils varying in thickness from 5 to 20 feet. Groundwater generally flows in the saprolite and toward the northwest away from the site. The groundwater discharges into streams to the west and northwest of the site [ARCADIS 2016].

Many investigations and remedial activities have been ongoing since 1993. These have included soil, groundwater and surface water sampling. Additionally, the underground storage tanks have been removed. These activities have also included the operation of an air sparge/soil vapor extraction system from 1996 to 2004 and the operation of a groundwater pump and treat system from 1999 to 2013. Also, the U.S. Army conducted an in-situ bioremediation pilot test from 2005 to 2007 to attempt to treat VOCs in the groundwater [Weston 2013]. Activities have slowed in the last few years due to a change in property owner and a loss of electricity on-site.

Discussion

Groundwater

There are no drinking water wells near the site that could be impacted by groundwater contamination. However, the contaminated groundwater plume has moved off-site. The groundwater plume is thought to be moving under an adjoining residential area (Figure 1, Attachment A). This leads to the potential for contaminants to enter indoor air via vapor intrusion. Because of this, DPH screened contaminants measured in monitoring wells against ATSDR's groundwater VI CVs which indicates a potential for vapor intrusion to occur [ATSDR 2016]. DPH used the lower of the cancer and non-cancer VI CVs for this preliminary screening to determine if a vapor intrusion investigation is needed for this site. For ethylbenzene and xylene, N.C. DEQ groundwater vapor intrusion screening levels (VISLs) were lower than ATSDR VI CVs. Therefore, the VISLs were used for screening [DWM 2016].

In 2014 and 2015, the U.S. Army Corps of Engineers tested 23 on-site monitoring wells and 6 off-site monitoring wells (Figures 3 and 4, Attachment A) [ARCADIS 2016]. This evaluation does not include four on-site wells (MW-104, MW-110, MW-111 and MW-112) as these wells are located in the bedrock. We do not expect contaminants found in the groundwater at this depth to volatilize into homes. This evaluation includes the remaining 19 on-site wells in the shallow groundwater. Figure 4 also contains some off-site surface water sampling that will be evaluated in a future assessment. Currently, no one occupies buildings on-site. Therefore, we do not expect exposures to contaminants through vapor intrusion on-site. However, DPH still screened contaminants found in on-site monitoring wells against VI CVs or VISLs. Off-site monitoring wells are located adjacent to or amongst the homes neighboring the site. We screened contaminants found in off-site wells to identify the potential for vapor intrusion into homes near the site. Summarized below are off-site and on-site monitoring well data. Figures 3 and 4 in Attachment A contain this data.

Table 1. TAMP site. Summary of off-site monitoring well samples from 6 wells collected in 2014 and 2015 (Figure 4, Attachment A).¹

| Contaminant | Number of Samples | Number of Detections | Detection(s) (µg/L) | No. of Detections Greater than CV | Comparison Value (CV) (µg/L) | Wells over CV |
|-------------------|-------------------|----------------------|---------------------|-----------------------------------|------------------------------|-----------------|
| Chloroform | 6 | 1 | 1.0 | 1 | 0.287 (Ca) | TAMP-MW-1 |
| Tetrachloroethene | 6 | 1 | 19 | 1 | 5.26 (Ca) | SP-1 |
| Trichloroethene | 6 | 3 | 0.38J - 41 | 2 | 0.55 (Ca) | SP-1, TAMP-MW-3 |
| Vinyl chloride | 6 | 2 | 0.52J - 60 | 2 | 0.096 (Ca) | MW-SP-3, SP-1 |

Notes: µg/L = micrograms of contaminant per liter of water
 CV = comparison value
 J = indicates estimated concentration
 Ca = cancer vapor intrusion comparison value

¹DPH screened groundwater data against ATSDR vapor intrusion comparison values (VI CVs) [ATSDR 2016].

Tarheel Army Missile Plant (TAMP) Site
Burlington, Alamance County, North Carolina

All four contaminants listed in the table above are off-site contaminants of concern due to exceedances of comparison values (CVs). More than one monitoring well off-site had detections of trichloroethene and vinyl chloride above the CV. Monitoring well SP-1 is located in the middle of the neighboring homes and contains the highest levels of tetrachloroethene, trichloroethene and vinyl chloride.

Table 2. TAMP site. Summary of on-site monitoring well samples from 19 wells collected in 2014 (Figure 3, Attachment A).²

| Contaminant | Number of Samples | Number of Detections | Detection(s) (µg/L) | No. of Detections Greater than CV | Comparison Value (CV) (µg/L) | Wells over CV |
|--------------------|-------------------|----------------------|---------------------|-----------------------------------|------------------------------|-------------------------------------------------------------------------------------------------|
| Benzene | 19 | 4 | 0.39J - 20 | 3 | 0.57 (Ca) | MW-115, MW-108, MW-106 |
| Chloroform | 19 | 8 | 0.24J - 9.9 | 7 | 0.287 (Ca) | MW-102, MW-114, MW-2, MW-103, MW-113, MW-116, MW-11 |
| 1,2-Dichloroethane | 19 | 2 | 2.2 - 5.6 | 2 | 1.3 (Ca) | MW-114, MW-2 |
| Ethylbenzene | 19 | 2 | 9 - 150 | 1 | 34.9* | MW-106 |
| m-xylene/p-xylene | 19 | 2 | 1.1J - 85 | 1 | 71.1* | MW-106 |
| Tetrachloroethene | 19 | 10 | 0.23J - 400 | 7 | 5.26 (Ca) | MW-102, MW-103, MW-117, MW-107, MW-11, MP-1, MP-2 |
| Trichloroethene | 19 | 14 | 0.24J - 6300 | 13 | 0.55 (Ca) | MW-102, MW-114, MW-2, MW-109, MW-103, MW-117, MW-108, MW-101, MW-107, MW-11, MP-1, MP-2, MW-105 |
| Vinyl chloride | 19 | 6 | 0.91J - 51 | 6 | 0.096 (Ca) | MW-114, MW-115, MW-109, MW-117, MW-108, MP-2 |
| Naphthalene | 19 | 1 | 30 | 1 | 4.6 (Ca) | MW-106 |

Notes: µg/L = micrograms of contaminant per liter of water
CV = comparison value
J = indicates estimated concentration
Ca = cancer vapor intrusion comparison value
*DPH used North Carolina Department of Environmental Quality groundwater vapor intrusion screening levels (VISLs) as these were lower than ATSDR's VI CVs.

All contaminants listed in the table above are on-site contaminants of concern due to exceedances of CVs. Many of the monitoring wells on-site contain chloroform, tetrachloroethene, trichloroethene and vinyl chloride. Wells closest to the Waste Accumulation Pad near the center of the site had the highest levels of these contaminants.

²DPH screened groundwater data against ATSDR vapor intrusion comparison values (VI CVs) [ATSDR 2016], unless otherwise noted.

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In conclusion, DPH reiterates that we do not have adequate data to determine whether groundwater contaminants from the TAMP site are entering indoor air at residences neighboring the site via the vapor intrusion pathway. While our review of the available groundwater data suggests the potential for vapor intrusion, soil gas and indoor air data are currently not available to fully evaluate residents' potential exposures to these contaminants in their indoor air. Therefore, there is an immediate need for additional groundwater, soil gas and indoor air sampling, as appropriate, to further characterize the potential for vapor intrusion at nearby homes and the possible impact on building occupants. DPH will continue to work with the property owner and potentially responsible party to evaluate site conditions, environmental data, and make recommendations to protect public health, as necessary.

Please do not hesitate to contact me at (919) 707-5900 if you have any questions regarding this letter.

Sincerely,

Jamie Pritchett, MTox
Health Assessor, Health Assessment, Consultation & Education Program
Occupational and Environmental Epidemiology Branch, Division of Public Health
N.C. Department of Health and Human Services

cc: Shelley Gibbons
ARCADIS
801 Corporate Center Drive, Suite 300
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References

[ARCADIS 2016] *Tarheel Army Missile Plant (TAMP), Burlington, North Carolina* [PowerPoint]. PIKA-ARCADIS. October 26, 2016.

[ATSDR 2016] *Evaluating Vapor Intrusion Pathways: Guidance for ATSDR's Division of Community Health Investigations (October, 2016)*. Agency for Toxic Substances and Disease Registry. https://www.atsdr.cdc.gov/docs/svi_guidance_508.pdf

[Johnson 2003] *Tarheel Army Missile Plant Remedial Action Plan – Final Report*. C.C. Johnson & Malhotra, P.C. May 21, 2003.

[DWM 2016] *Residential Vapor Intrusion Screening Concentrations (October, 2016)*. N.C. DEQ Division of Waste Management. October 2016. <https://deq.nc.gov/about/divisions/waste-management/waste-management-permit-guidance/dwm-vapor-intrusion-guidance>

[Solutions 2003] *Tarheel Army Missile Plant Remediation Long Term Monitoring Plan – NCDENR Draft*. Solutions Industrial & Environmental Services, Inc. December 31, 2003.

[Weston 2013] *RE: Tarheel Army Missile Plant (TAMP) Facility, Burlington, North Carolina, NC7210020544*. Weston Solutions, Inc. August 6, 2013.

REPORT PREPARATION

The North Carolina Department of Health and Human Services prepared this letter health consultation for the Tarheel Army Missile Plant (TAMP) site under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). We wrote it in accordance with the approved agency methods, policies, and procedures existing at the date of publication.

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Attachment A

Maps of Tarheel Army Missile Plant Site

Tarheel Army Missile Plant (TAMP) Site
Burlington, Alamance County, North Carolina



Figure 1. Map of the Tarheel Army Missile Plant site. Property line is marked in red. Homes are located immediately north and northwest of property line.

Tarheel Army Missile Plant (TAMP) Site
 Burlington, Alamance County, North Carolina

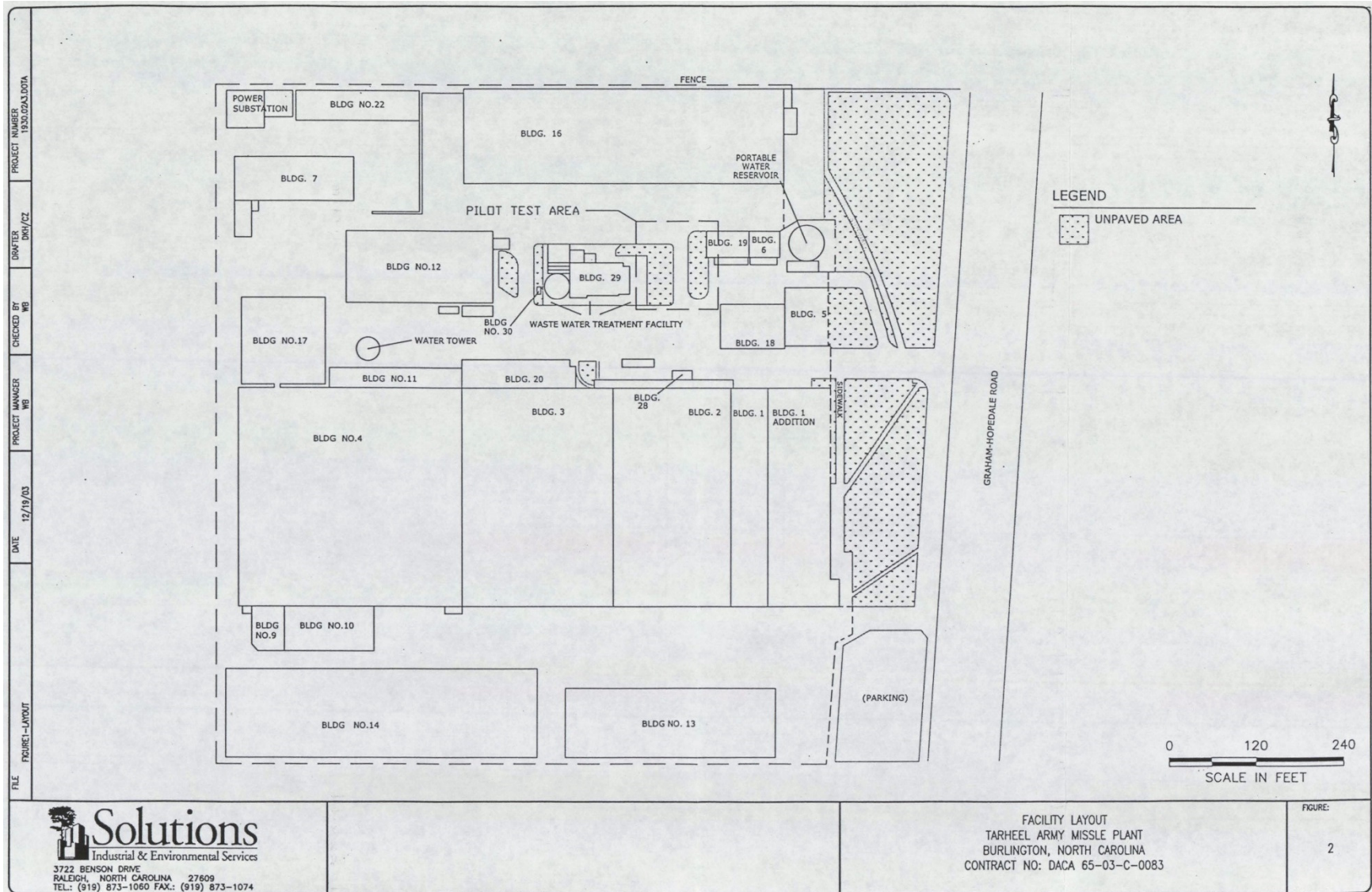
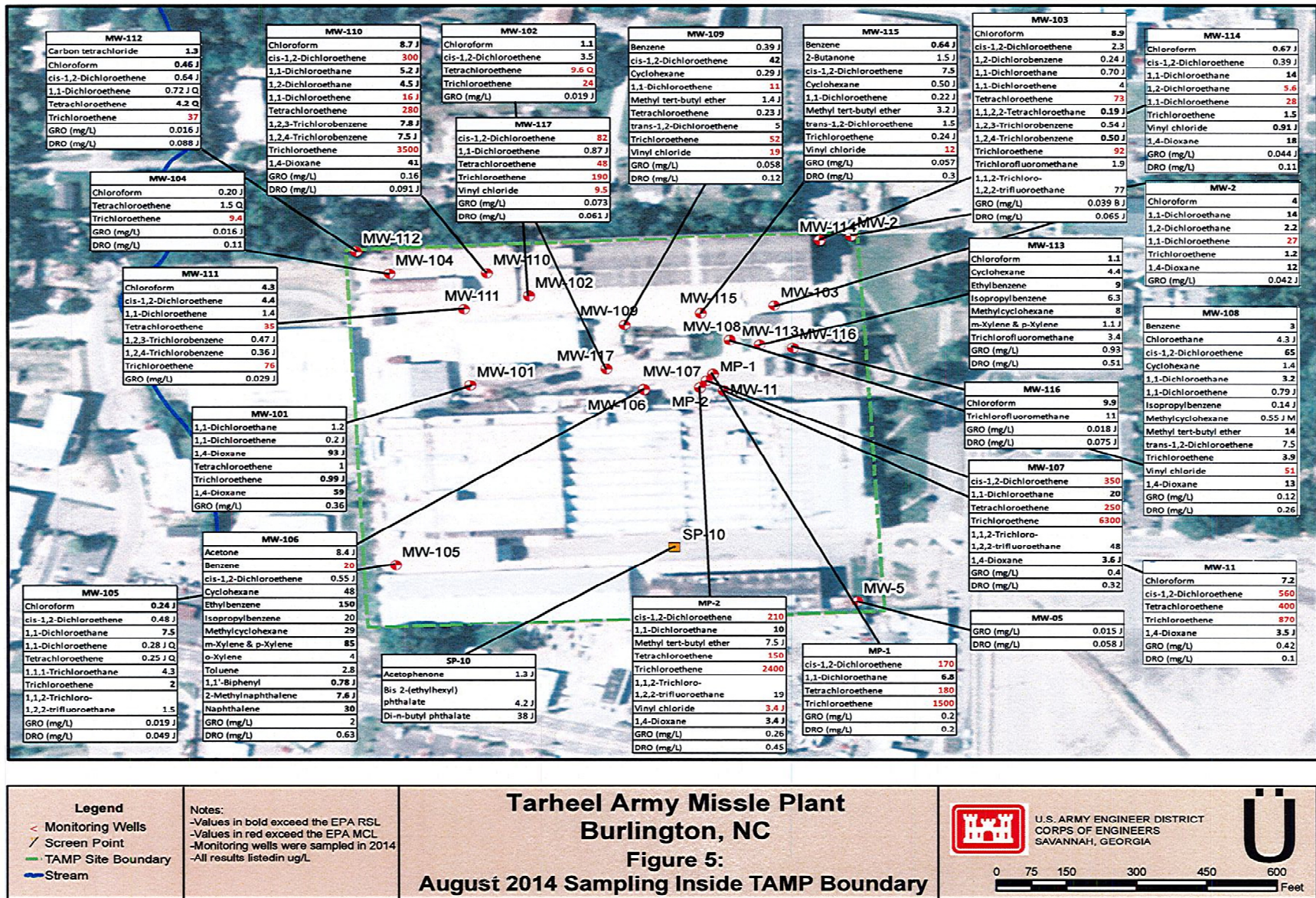


Figure 2. Layout of buildings on the Tarheel Army Missile Plant (TAMP) Site [Solutions 2003].

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Tarheel Army Missile Plant (TAMP) Site
 Burlington, Alamance County, North Carolina

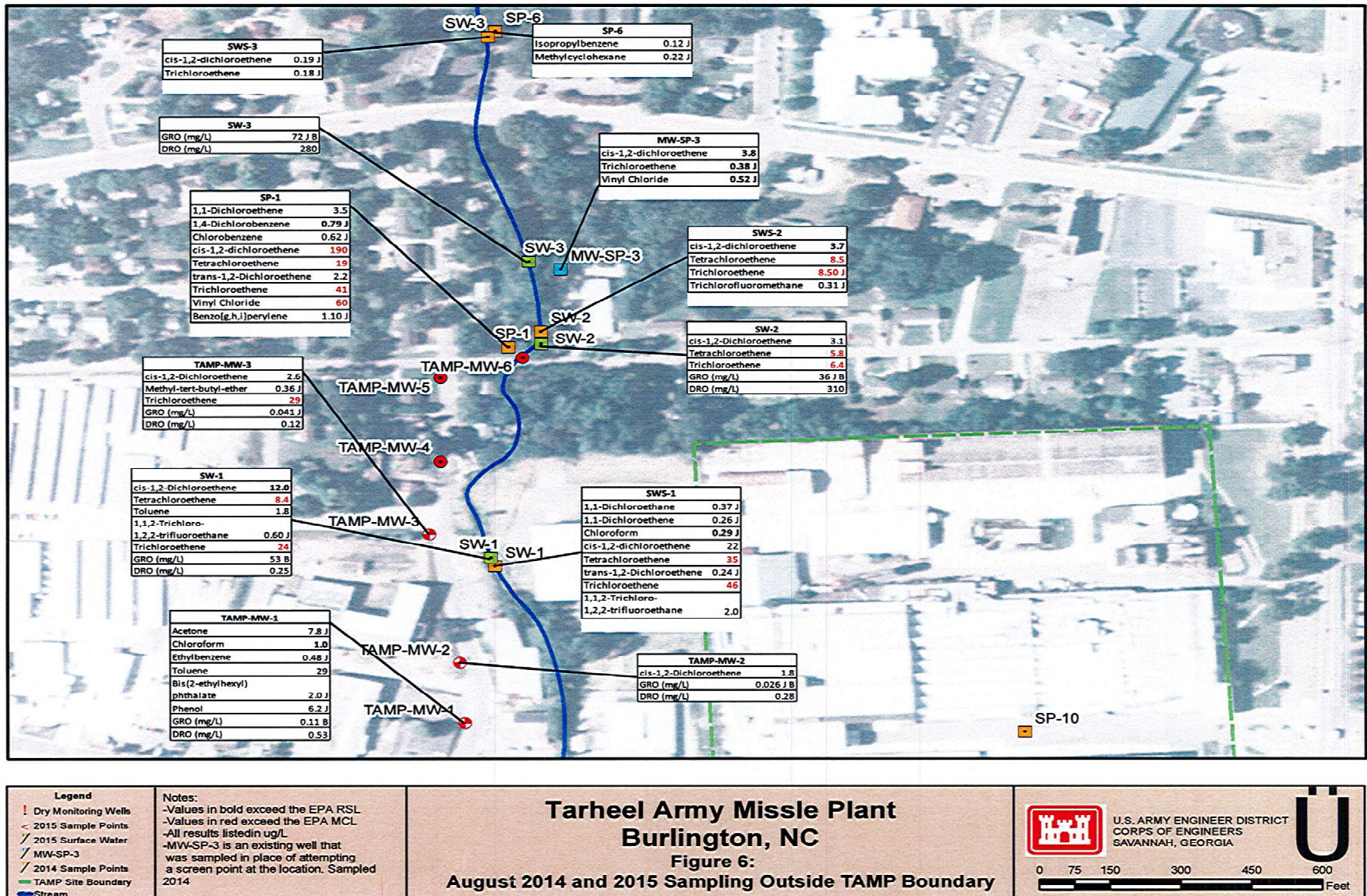


Figure 4. Tarheel Army Missile Plant off-site groundwater sampling – August 2014 and 2015 [ARCADIS 2016]. Wells are located adjacent to residential area. Surface water samples will be evaluated in a future assessment.